Revenge of the BBS Numbers

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- Fruit Crate BBS
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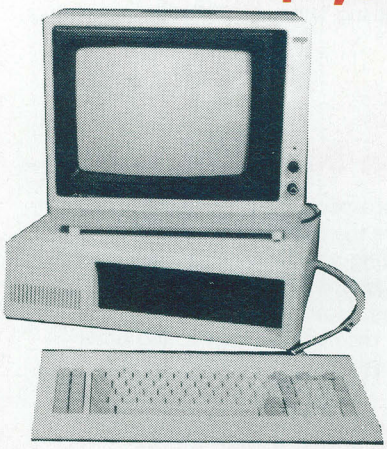

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Revenge of all the BBS Numbers In the World

On the reasonable assumption that there are still no technologically civilized settlements outside Canada this list of systems doesn't take in anything beyond our borders. However, we've checked out virtually every public system in the land.

10
Poker

While not so lively as the Frogger nor so exciting as the Microsoft flight simulator, CN! Poker is an interesting computer game that lets you best the pants off something normally incapable of wearing any.

16
Data Base Managers

The prospect of having a computer reduce the kilotons of paper presently engulfing your desk top down to a five and a quarter inch disk may sound appealing. However, make sure you're getting a data compactor . . . and not a trashmasher.

22
Turbo PASCAL

Low cost language packages are everywhere. Most of them are turkeys and some would require considerable work to even manage this status. Here's a look at one, however, that's anything but.

26
The New Printers

Once there were just dot matrix and daisy wheel printers. However, that was too easy and after a while there came to be assorted mutations and fusions of the two. Here's a peek at the various resulting creatures.

30
C64 Peripheral Survey

If it plugs in, snaps on, attaches to, hangs over, sits under, goes behind slips inside, enhances, modifies, controls, extends, mutates or teleports into the fourteenth dimension the humble Commodore 64 it'll be here.

34
Morrow Review

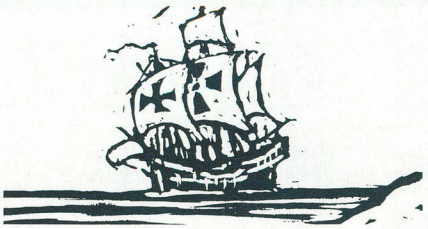
Really powerful slick business systems do not all have 8088's in them. This one runs CP/M Plus and does some pretty amazing things.

38
The Apple II Something

There's another new Apple on the way. It's compatible with the Apple II+ and yet has a hundred and twenty eight K of RAM and fits in a briefcase. Beware, ye clones . . .

40
Don't Shoot The Printer

As frustration sets in and you begin to wonder whether you wouldn't have been better off with a couple of monks and some quills leaf through this feature. It'll help you to better understand the complexities of printers.



74
Search For Wordstar

Detailing with large Wordstar documents can often be a bit easier if you know the secret rites of search and replace. Remove all the vowels? It's as easy as control Q.

46
Software Buccaneers

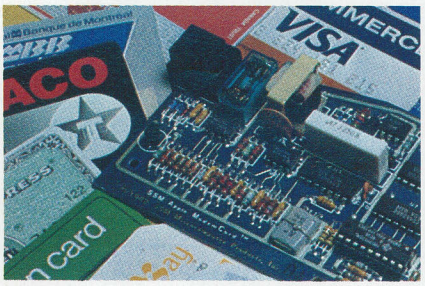
Software piracy and the law have always been a bit touchy when put in the same room together. This features looks at the grotty details.

52
The Fruit Crate BBS

Entirely written in Applesoft except for the bits that aren't this simple BBS package will turn you into a SYSOP without a similar transformation of your bank account into a black hole.

61
List! Special

From printers across the land have spewn forth these programs . . . pages of them. If you like to meddle with bits of code you'll have a blast with this.



64
SSM Modem Review

The cool thing about smart modems is that they'll do an amazing amount for you. The uncool thing is the price you pay for one. Here's slightly less ruinous card stuffed with capacity.

68
Get SMARTS

You want function keys, don't you? Everybody likes function keys. However, not everyone has the keys. For those not thus blessed we present SMARTS, software which takes up the slack.

79
Word Processing Survey

There are word processors available for virtually everything with a keyboard. This overview should help you get the confusion down to a manageable hugeness.

82
Forth

As weird little languages go this is one of the weirdest. However, Forth is a powerful way to write sophisticated applications that run very, very fast.

86
The Doctor's Little Black Computer

The medical community . . . really isn't into computers very much. A practicing physician takes a look at the state of the art.

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Next Month in Computing Now!

IBM Supplement

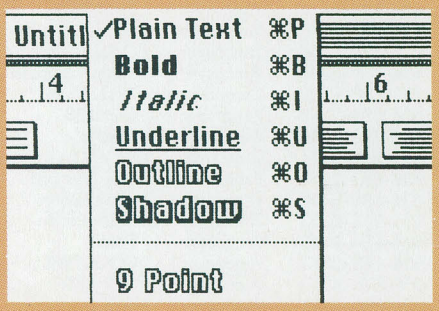
Next issue we'll be looking at a number of things of interest to owners of PC compatible systems. . . and owners to be. As the prices of these computers drop more and more souls are finding that they are powerful and cost effective ways to get a handful of the state of the art. We'll scrutinize the state next month.

Fables of the JLS XT

Not resting on his chips, Joe Sutherland once more sallies forth with his trusty steed and his do it yourself printed circuit board kit to produce a system which emulates the powerful IBM XT. A full review and royal gala takes place next issue.

Local Area Networks

While large and expensive, LANs are one approach to having several computers share the same facilities. However, they do have their trickier aspects, and none of the major systems are the least bit compatible with each other. Nothing more complicated than a rock is ever understandable.



MacWrite

The Macintosh word processor is a thorough party to use with facilities which make earlier word processors look like hand presses by comparison. In the next issue we'll be looking at the features and capabilities of this exciting bit of software. Drool . . .

Rescue Your 64

As you get more sophisticated at programming your 64 you'll also find yourself coming across that agonizing situation of having a computer full of code which hangs up. Next month we'll be having a look at the structure of the 64's program storage and a way to unhang even a comatose machine.

Revenge Of All The BBS Numbers In the World

We'd originally entitled this as 'I Was a Teenage All The BBS Numbers In The World,' but the title ran off the page...

by Brian Greiner

Once again, setting forth on his gallant modem, the three hundred baud knight went off to challenge the bulletin boards of our fair land. This list is the spoils of his quest... all of the systems in the entire world, as of our going to press, with the exception of those outside Canada.

This is as good a list as there can be. All of these numbers were called at least once. The growing interest in boards resulted in our brave warrior getting a busy signal a lot of the time... but this would indicate that there was at least some life out there. About a third of these systems have actually been logged onto.

A few of these boards are marked with asterisks. These are systems which purported to be up but didn't answer when they were called. Perhaps they were just down or perhaps they have vanished into the night from which they sprang... forever.

British Columbia			
604-462-8633	Mission	Mission BBS	9 PM to 8 AM
604-562-9519	Prince George	Prince George RCP/M	24 hrs
604-563-9998	Prince George	TRS-80	24 hrs.
604-224-2337*	Vancouver	MicroStat	24 hrs.
604-224-7206	Vancouver	Computerworld	
604-251-4043	Vancouver	Crack Shop II	9 PM to 9 AM
604-294-3943	Vancouver	The Pirate	9 PM to 9 AM
604-430-4145*	Vancouver	H&S Microsystems	9 PM to 9 AM
604-435-2993	Vancouver	Kent Toy BBS	
604-437-7001*	Vancouver	ABBS	
604-438-2468	Vancouver	SATYRICON CBBS	24 hrs.
604-461-4033	Vancouver	Columbia BBS	9 PM to 9 AM
604-464-7693	Vancouver	POCO BBS	24 hrs.
604-522-5614	Vancouver	Small BBS	9 PM to 9 AM
604-584-2543	Vancouver	Terry O'Brian BBS	
604-585-0680	Vancouver	Color 80 BBS	
604-588-3255	Vancouver	Sprite Computer	9 PM to 9 AM
604-588-9199	Vancouver	Apple Core	
604-594-7398	Vancouver	Comm80	9 PM to 9 AM
604-596-0146	Vancouver	Basic'ly	
604-596-0314	Vancouver	V.P.C.C.	
604-687-2653	Vancouver	Star Trax BBS	6 PM to 9 AM
604-688-5405	Vancouver	AFC Raiders	6 PM to 9 AM
604-738-2773	Vancouver	Color Pacific	
604-738-1640	Vancouver	TVG	
604-738-2773	Vancouver	COCO BBS	
604-876-4719	Vancouver	GTS BBS	5:30 PM to 9 AM
604-876-7191	Vancouver	GTS	6 PM to 9 AM
604-922-1336	Vancouver	Apple Reich	
604-926-5070	Vancouver	Apple West	9 PM to 7 AM
604-937-0906	Vancouver	Frog Hollow	
604-941-0041	Vancouver	Analog BBS	
604-985-3962V	ancouver	Crack Shop I	9 PM to 9 AM
604-986-4444	Vancouver	JGC	
604-384-1148*	Victoria	Excalibur	
604-384-4711*	Victoria	Island Micro	6 PM to 8 AM
604-478-2234	Victoria	DataWest	
Alberta			
403-246-9272	Calgary	Apple BBS	10 PM to 4 PM
403-250-2488	Calgary	TCS/Computershop NE	
403-252-1447	Calgary	Computer Innovations	24 hrs.
403-287-3638	Calgary	Computer Shop BBS	7 PM to 9 AM
403-425-9543	Edmonton	CentralTRS BBS	24 hrs.
403-435-1949	Edmonton	CONEXIONS	
403-454-6093	Edmonton	Edmonton RCP/M	24 hrs.
403-463-5774	Edmonton	South Side RCP/M	24 hrs.
403-466-7656	Edmonton	Commodore BBS	9 PM to 6 AM
403-469-6257*	Edmonton	Saulicomp	8 AM to midnight
403-471-2827	Edmonton	Westworld Net-Works	24 hrs.
403-474-0147	Edmonton	Norther Alberta COCO	6 PM to 3 PM
403-479-3450	Edmonton	Stadium RCP/M	24 hrs.
403-482-6854	Edmonton	Computron RBBS	24 hrs.
403-483-1935*	Edmonton	KCBBS	9 AM to Midnight
403-484-5981	Edmonton	Meadowlark RCP/M	6 PM to 10 AM
403-488-7119	Edmonton	CMD BBS	6 PM to 8 AM
403-986-4025	Leduc	IBM PC Users' Group	6 PM to 2 AM
403-320-6923	Lethbridge	Gaming System	charges fee
Manitoba			
204-785-8742	Selkirk	MMS BBS	24 hrs.
204-942-1109	Winnipeg	VE4 Micro BBS	24 hrs.
Ontario			
416-632-5653	Burlington		
519-354-6827	Chatham	Chatham BBS	
705-445-6032	Collingwood		
416-877-0232*		Halton/Peel Club	
416-877-0933	Georgetown	HARC Ham Radio	
613-385-4598	Hamilton	HBO Atari BBS	24 hrs.
613-385-8500	Hamilton	Atari BBS	11 PM to 9 AM
416-433-0804*	Oshawa	Computerland	
416-728-6574*	Oshawa	Motor City BBS	
613-230-7154	Ottawa	Compucenter	9:30 PM to 8 AM
613-236-3009*	Ottawa	OCG CBBS	
613-725-2243*	Ottawa	ABBS	
613-725-1538	Ottawa	Graffitti	
613-741-7511*	Ottawa	COTS	
613-748-1035	Ottawa	MMS	
613-820-4646	Ottawa	B & S	
613-835-3225	Ottawa	BAC Financial	10 PM to 7 AM
416-839-3260	Pickering	Superboard	24 hrs.
807-345-7199	Thunder Bay	ASC Microsystems	non-business hrs
416-429-6044	Toronto	TPUG-PET	8 PM to 9 AM
416-226-9260	Toronto	Willowdale CBBS	24 hrs.
416-231-0538	Toronto	Toronto RCP/M IV	24 hrs.
416-231-1262	Toronto	Toronto RCP/M II	24 hrs.
416-232-0269	Toronto	Toronto RCP/M III	24 hrs.
416-232-0442	Toronto	Toronto RCP/M I	24 hrs.
416-265-3227	Toronto	BULL '80	7:30 PM to 8 AM
416-282-2314*	Toronto	After Hours	10 PM to 7 AM
416-293-1796	Toronto	Exceltronix On-Line	24 hrs.
416-366-2069	Toronto	CFTR BBS	7 PM to 9 AM
416-421-8930	Toronto	Phobos	24 hrs.
416-423-5149	Toronto	ETI/CN BULL I	6 PM to 9 AM
416-439-0065	Toronto	Games BBS	7 PM to 9:30 PM
416-445-1725	Toronto	Toronto Twilight Com	24 hrs.
416-445-5192	Toronto	PMS LOGIC	24 hrs
416-445-6696	Toronto	NET-WORKS I	24 hrs.
416-461-2110	Toronto	CBBS Toronto	24 hrs.
416-482-2823	Toronto	NightOwl	24 hrs.
416-484-9663	Toronto	EM-X BBS	24 hrs.
416-487-5833	Toronto	BBBBS I	24 hrs
416-487-2593	Toronto	Nortec I	24 hrs.
416-488-6569	Toronto	Darkworld	24 hrs.
416-499-7023	Toronto	PCanada-IBM	24 hrs.
416-532-6091	Toronto	64 BBS	24 hrs.
416-593-7460	Toronto	Net-Works Canada I	24 hrs.
416-622-2462	Toronto	Atari Infosystem	24 hrs.
416-622-2487	Toronto	TAPS Atari	24 hrs.
416-622-7275	Toronto	Starship Atari	24 hrs.
416-624-5431	Toronto	PSI-Wordpro BBS	6 PM to 9 AM
416-640-3434	Toronto	TBBS	24 hrs.
416-665-1430	Toronto	Supersort	24 hrs.
416-683-3733	Toronto	NET-WORKS II	24 hrs.
416-698-0619	Toronto	Modem Astrology	24 hrs
416-731-4797	Toronto	The Jail	24 hrs.
416-743-6221	Toronto	CoCo Nut	4 PM to 7 AM
416-762-1820	Toronto	Insane Asylum NW	9:30 PM to 8 AM
416-782-9686	Toronto	Micro 80	24 hrs.
416-787-8630	Toronto	NetCan][	8 PM to 6 PM
416-763-5703	Toronto	TOCCS	
416-884-6198	Toronto	RTC BBS	6 PM to 9 AM
416-925-2910	Toronto	TRACE BBS	24 hrs.
416-927-1921*	Toronto	Supertronix BBS	7 PM to 9:30 AM
416-978-6893	Toronto	Medical Network	5 PM to 8 AM
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Quebec			
418-659-3863	Quebec City	Telesiaq	6 PM to 9 AM
514-382-3629	Montreal	6 AM to 7 PM	
514-481-6329	Montreal	RCP/M	6PM to 8 AM
New Brunswick			
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Bulletin Board

UltraPAK, a recently introduced add-on board for the IBM PC from *Tseng Laboratories* allows full compatibility with the Lotus 1-2-3 software package. The card contains a serial and parallel port, a clock calendar, and a one hundred and thirty-two column video display...

A truly varied CP/M word processor, **Palantir**, is being distributed in Canada by *AMIES*. Aside from standard word processing features, the product offers proportional spacing and file merging...

Office Specialty is offering a line of computer workstations for both flexibility and comfort. The **DataGroup** furniture's modular design allows it to be used in individual units or be integrated into a total office system...

Super Text Professional, a popular word processor from *Muse* is now available for the Atari line of microcomputers. The program requires a minimum of forty-eight K of RAM, and offers a variety of printer drivers...

Two new diskette storage cases are now being produced by *Amaray Corporation*. **Media Mates** 3 and 5 have built-in handles, and hold thirty and fifty diskettes respectively...

A new 60008 co-processor card for the Apple II computers is now available from *Stellation Two*. Code compatible with the 68000 chip, the **McMill** is bundled with Fig forth software. An optional assembler is also offered...

Version four of *Stoneware's* **DB Master** program can now convert Apple II files from VisiFile and pfs:File into those compatible with DB Master. Once converted, the new files have a greater storage capacity...

File Mover, a CP/M utility that runs on any 8080, 8085 or Z-80 processor has been introduced by *Brydan Business Systems*. Using a serial RS232C link, the program can transfer any type of CP/M file from one computer to another with error detection, correction protocol and automatic retry...

Arctic Data has announced **Patient Recall System**, a professional package for CP/M-80, CP/M-86 and MS-DOS systems. The menu driven program facilitates appointment scheduling with automatic recall card generation and printing...

The Comrex **CR-II** daisy wheel printer has been introduced through *Epson Canada Limited*. The inexpensive letter quality printer operates bi-directionally at twelve characters per second and has a five K buffer...

BPI and **MicroPlan** are two new packages for the Hewlett-Packard Touchscreen Computers. The software packages have been enhanced to accept alternate input from users touching the *HP-150's* screen...

Monroe Systems For Business have unveiled a new sixteen bit business microcomputer. The one hundred and twenty-eight K **System 2000** uses the 80186 processor and comes with CP/M-86 DPX, MS-DOS and GW BASIC...

A sixty-four K printer buffer with pause, hold, and hex dump features is being manufactured and distributed in Canada by *Computer Age Ltd.* The **Angel** is supplied with both RS232C and Centronics interfaces...

Peachpak 4, a business accounting package from *Peachtree Software* has been enhanced and is now available for the IBM PC, its compatibles, the TI Professional and the Zenith Z-100...

An improved version of *Batteries Included's* word processor for the Commodore 64 is now on the market. **PaperClip** can now support eighty columns through either software or hardware, and carries over one hundred printers in its internal configuration files...

A multi-expansion port for Timex Sinclair computers, the **Softbox**, is available from *Intercomputer Micro Systems*. The port offers four expansion slots, a card edge, and a computer on/off switch...

A software sailing tutorial and manual entitled **Regatta** can be purchased from *Lenbrook Electronics*. Produced for the Apple II computer, the disk simulates four different races on a choice of four lakes...

Alternate Computer Training is a new project created to train and place physically handicapped adults as **applications programmers.** Once an aptitude test is passed, applicants become employees of A.C.T. while being trained. The training is free, as is placement...

Netmaster, a terminal program for the Apple II computer from *Zoom Telephonics* provides a forty K buffer for sixty-four K systems, and can transmit and receive any DOS 3.3 file. It can be purchased separately or bundled with Zoom's Networker modem...

Ahem... a correction. A posting in Bulletin Board in the March issue implied that **Corona PCs** were now only being sold in Canada by Olivetti. It seems that Olivetti, (and recently, Philips Information Systems) entered an agreement with Corona Data Systems of the U.S. whereby they would be allowed to re-label the Corona and sell it under their house name.This agreement does not affect the availability, sale or supply of the original Corona PC and portable, which are still marketed by **Scarsdale** all across Canada.

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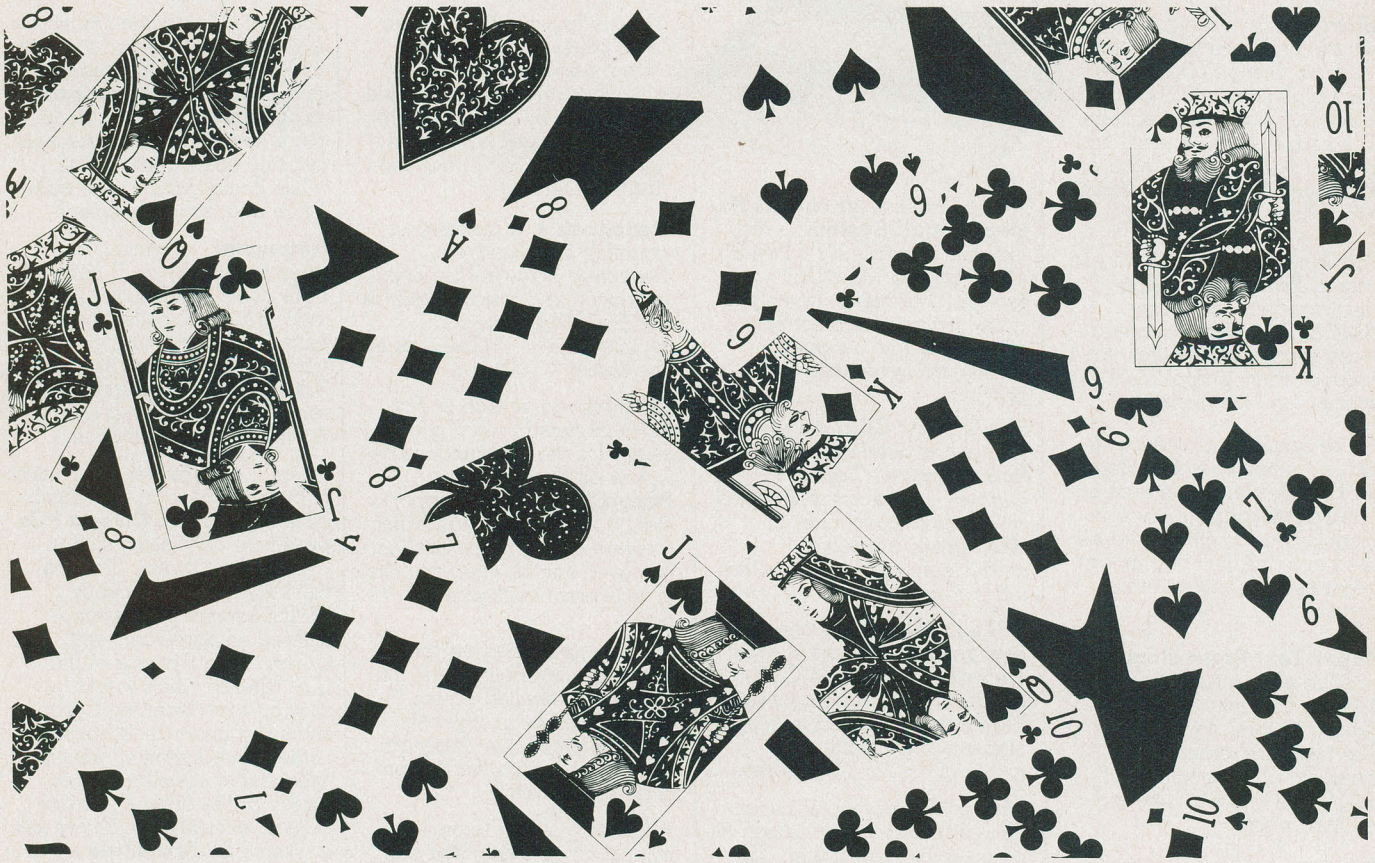

Playing poker with a computer has its advantages. It doesn't cheat, it doesn't try to read your face and if you find yourself in the hole to it, you can shut it off. Here's a byte of software to deal your system.

by Steve Rimmer

There's a certain mystique about a decent game of poker . . . especially one which runs on for a few days. Check out the players . . . there's this tall dude back in the shadows wearing a Lee Van Cleef outfit who never says anything. There's a little man dealing, sweating profusely as he eyes the fellow to his right . . . a muscular, evil looking gentleman with false eyelashes who keeps rubbing the handle of a gun protruding from his pocket. Hovering about the table is a gorgeous blonde in a black satin evening dress smoking a joint in a cigarette holder . . .

The night draws onwards to dawn as the small man places the last of his stake in the centre of the table and deals himself two cards. The cowboy smiles and lays down a straight . . .

Months of programming have failed to come up with anything resembling a gorgeous blonde in a black satin evening dress. However, we can make a computer play a pretty mean hand of poker. In fact, it's possible to give it a personality and a definitive strategy. What's more, it can even manage to keep its face straight when it has a good hand.

Presented herein is a simple poker program. While it ignores some of the freakier manifestations of the game, it does manage to get the essential elements into a fairly short bit of code.

Written in Microsoft BASIC, it should be useable . . . or adaptable . . . for virtually any system.

Draws and Calls

The program starts you, and the electronic player directly in front of you, off with five hundred dollars . . . or any other currency you fancy. You can change the stake in line 230 of the program. It displays two hands on the screen in fairly rudimentary graphics . . . MBASIC doesn't allow for visual nuance. Then it just lets it all happen.

The game is fairly simple and deviates from the most commonly encountered versions of poker in a few ways. It's a five card hand with nothing wild and two one-card draws. The computer will bet first, after which you can bet and draw your stuff. When you've stopped drawing the machine will play its hand and figure out the results.

Winnings and losings are calculated and the respective pots adjusted at the end of each hand.

A lot of the work in writing this sort of game is that it wants to get large . . . it's possible to program incredible amounts of nuisance into it without half trying . . . leaving everyone else with the task of entering the nasty code and making it work. This version is probably a fair compromise, and it does play a pretty serious game. If you feel up to it you can easily add some additional stuff to it.

The deck of cards is held in the array DECK$, as read from the DATA statements commencing in line 150. In dealing a card the program . . . down in line 2010 . . . picks a random number between zero and fifty-one and examines that entry into the card table. That's a virtual card table,

without folding legs. If it's a valid card, it exchanges it with the string "XX". This way, subsequent deals can't pull the same card twice.

One of the problems with this sort of program is that it requires real random numbers. In fact, straight MBASIC can't produce these . . . the function RND returns entries in a table of pseudo-random numbers. While this works for most applications, such as statistical analysis, it kind of fails for card games as you wind up playing the same hands each time you start the game. Thus, the random number generator must be seeded before each hand.

Seeding the table doesn't make the numbers any more random, but they will appear so, because there is no immediate correlation between seedings unless you force one. A seed is just any number between zero and sixty-five thousand and something. In the case of this program, it asks for a four digit number before each hand. The digits don't echo back to the screen, by the way . . . inaccuracy is a desirable feature in getting a random number seed.

In many cases you will be able to dispense with the manual seeding. Standard version five MBASIC is actually one of the few which does not allow any way to do this. Most others seed the generator automatically by using the time between keystrokes.

If yours doesn't do so, you can still get it together if you have the INKEY$ function available. Do something like this . . .

```
440 PRINT CLS$; STRING$(22,LF$); TAB(PD); 'Hit
    any key to continue';
445 A$=INKEY$ : A=A+1 : IF A$="" THEN 445
447 IF A > 65536 THEN A = A - 65536 : GOTO 447
450 RANDOMIZE (A)
```

The value of A will thus be dependant on how long it takes you to hit any key to continue.

Many versions of MBASIC don't have INKEY$ . . . they return a null set even if you drop a brick on the keyboard. If this is the case with yours, you'll be stuck with the code as it's presented here.

Raise

In order to play the game, the computer has to be able to analyse the hands dealt. First off, it has to know who won and, secondly . . . and more difficult to execute . . . it has to know what to trash and draw in playing its own hand.

Analysing a hand is basically an exercise in pattern matching. This is a whole lot easier if the cards are in some sort of order to begin with. As such, the first step of any analysis is to sort the cards into numerical order in the routine beginning with line 1070.

```
10 '     POKER!!!
20 '
30 '     Copyright 1984 (c) Steve Rimmer
40 '
50 '
60 '   *** DEFINES
70 CR$=CHR$(13)
80 LF$=CHR$(10)
90 HM$=CHR$(30)
100 CLS$=CHR$(26)
110 RET$=CR$+LF$
120 PD=14
130 DEBUG = 1
140 '   *** CARDS
150 DATA Ac,2c,3c,4c,5c,6c,7c,8c,9c,Tc,Jc,Qc,Kc
160 DATA As,2s,3s,4s,5s,6s,7s,8s,9s,Ts,Js,Qs,Ks
170 DATA Ah,2h,3h,4h,5h,6h,7h,8h,9h,Th,Jh,Qh,Kh
180 DATA Ad,2d,3d,4d,5d,6d,7d,8d,9d,Td,Jd,Qd,Kd
190 SUIT$="23456789TJQKA"
200 FOR X=1 TO 5 : C$(X,3) = "  " : NEXT X
210 '   *** ARRAYS
220 DIM DECK$(52)
230 POT(1) = 500 : POT(2) = 500
240 '   *** MAIN CODE
250 GOSUB 570 'DEAL HANDS
260 GOSUB 640 'SHOW HANDS FOR PLAY
270 GOSUB 1890 : GOSUB 1950 ' DO BETS
280 GOSUB 700 'HANDLE DRAW
290 GOSUB 810 'SHOW HANDS FOR CALL
300 GOSUB 1460
310 PRINT HM$; STRING$(22,LF$); TAB(PD)"Another
    hand? ";
320 A$ = INPUT$(1)
330 PRINT HM$;
340 IF INSTR("YyNn",A$)=0 THEN 310
350 GOSUB 1460
360 IF INSTR("Nn",A$)=0 THEN 240
370 PRINT HM$; STRING$(21,LF$); TAB(PD)"Thanks
    for the game. I wanna kill sheep now."
380 END
390 'SHUFFLE
400 RESTORE
410 FOR X=0 TO 51
420 READ DECK$(X)
430 NEXT X
440 PRINT CLS$; STRING$(22,LF$); TAB(PD);
    "Number to randomize ";
450 A$=INPUT$(4) : RANDOMIZE (VAL(A$))
460 PRINT CLS$
470 RETURN
480 'DEAL ONE HAND
490 PRINT HM$; : PRINT STRING$((ABS(HAND-
    2)*7)+7,LF$);
500 PRINT TAB(PD) " ------    ------    ------
    ------    ------ "
```

POKER!

```
510 PRINT TAB(PD) "I"C$(1,HAND)"    I
    I"C$(2,HAND)"    I  I"C$(3,HAND)"    I
    I"C$(4,HAND)"    I  I"C$(5,HAND)"    I"
520 PRINT TAB(PD) "I      I  I      I  I      I
    I      I  I      I"
530 PRINT TAB(PD) "I    "C$(1,HAND)"I  I
    "C$(2,HAND)"I  I    "C$(3,HAND)"I  I
    "C$(4,HAND)"I  I    "C$(5,HAND)"I"
540 PRINT TAB(PD) " ------    ------    ------
    ------    ------ "
550 PRINT TAB(PD) "   1         2         3
    4         5    "
560 RETURN
570 ' DEAL HANDS
580 GOSUB 390 'SHUFFLE
590 FOR X=1 TO 5
600 HAND=1 : GOSUB 2010
610 HAND=2 : GOSUB 2010
620 NEXT X
630 RETURN
640 'SHOW HANDS FOR PLAY
650 PRINT HM$ : PRINT  TAB(35) "CN! POKER";
    RET$; STRING$(79,"_");
660 IF DEBUG = 1 THEN HAND=3 : GOSUB 480 'SHOW
    DEALER'S HAND
670 IF DEBUG=0 THEN HAND=1 : GOSUB 1070 : GOSUB
    480 'SHOW DEALER'S HAND
680 HAND=2 : GOSUB 1070 : GOSUB 480 'SHOW
    PLAYER'S HAND
690 RETURN
700 'HANDLE DRAW 'HANDLE DRAW
710 K=1 : WHILE K<3
720 GOSUB 1460
730 PRINT HM$; STRING$(22,LF$); TAB(PD)"Enter
    card to trash or RETURN ";
740 A$=INPUT$(1)
750 IF INSTR("12345"+CR$,A$)=0 THEN 730
760 IF A$=CR$ THEN K=3 : GOTO 790
770 X=VAL(A$) : HAND=2 : GOSUB 2010
780 GOSUB 640
790 K=K+1 : WEND
800 RETURN
810 'SHOW HANDS FOR CALL
820 PRINT HM$ : PRINT TAB(35)"CN! POKER"; RET$;
    STRING$(79,"_");
830 GOSUB 1630
840 HAND=1 : GOSUB 1070 : GOSUB 480 'SHOW
    DEALER'S HAND
850 GOSUB 900 : PRINT HM$; STRING$(4+(ABS(HAND-
    2)),LF$); TAB(PD); RESULT$ 'ANALYSE HAND
860 HAND=2 : GOSUB 1070 : GOSUB 480 'SHOW
    PLAYER'S HAND
870 GOSUB 900 : PRINT HM$; STRING$(4+(ABS(HAND-
    2)),LF$); TAB(PD); RESULT$ 'ANALYSE HAND
880 GOSUB 1490 'SEE WHO WON
890 RETURN
900 'HAND ANALYSER
910 HIGH(HAND)=0
920 GOSUB 1070
930 GOSUB 1160 : GOSUB 1220 : GOSUB 1280 : GOSUB
    1340 : GOSUB 1400 'CHECK OUT HAND
940 RESULT$="GARBAGE" : GAME(HAND)=0
950 IF PAIR(HAND)>0 THEN RESULT$ = STR$(PAIR
    (HAND)) + " PAIR" : GAME(HAND)=PAIR(HAND)
960 IF THREE(HAND)=1 THEN RESULT$ = "THREE OF A
    KIND" : GAME(HAND) = 3
970 IF SRT(HAND)=1 THEN RESULT$ = "STRAIGHT" :
    GAME(HAND) = 4
980 IF FLUSH(HAND)= 1 THEN RESULT$ = "FLUSH" :
    GAME(HAND) = 5
990 IF PAIR(HAND)=1 AND THREE(HAND)=1 THEN
    RESULT$="FULL HOUSE" : GAME(HAND) = 6
1000 IF FOUR(HAND)=1 THEN RESULT$ = "FOUR OF A
    KIND" : GAME(HAND) =7
1010 IF FLUSH(HAND)=1 AND SRT(HAND)=1 THEN
    RESULT$ = "STRAIGHT FLUSH" : GAME(HAND) = 8
1020 IF FLUSH(HAND)=1 AND SRT(HAND)=1 AND
    HIGH(HAND)=13 THEN RESULT$ = "ROYAL FLUSH" :
    GAME(HAND) = 9
1030 IF HIGH(HAND)=0 THEN HIGH(HAND) =
    INSTR(SUIT$,LEFT$(C$(5,HAND),1))
1040 HIGH$ = MID$(SUIT$,HIGH(HAND),1)
1050 RESULT$= RESULT$ + "  " + HIGH$ + " HIGH"
1060 RETURN
1070 'SORT HAND
1080 FOR X=1 TO 5
1090 C(X,HAND)= INSTR(SUIT$,LEFT$(C$(X,HAND),1))
1100 NEXT X
1110 Z=0 : FOR X=1 TO 4
1120 IF C(X,HAND) > C(X+1,HAND) THEN SWAP
    C(X,HAND),C(X+1,HAND) : SWAP
    C$(X,HAND),C$(X+1,HAND) : Z=1
1130 NEXT X
1140 IF Z=1 THEN 1110
1150 RETURN
1160 'LOOK FOR PAIRS
1170 PAIR(HAND)=0
1180 FOR X=1 TO 4
1190 IF C(X,HAND) <> C(X-1,HAND) AND C(X,HAND) =
    C(X+1,HAND) AND C(X,HAND) <> C(X+2,HAND)
    THEN PAIR(HAND) = PAIR(HAND)+1 : IF
    HIGH(HAND) < C(X,HAND) THEN HIGH(HAND) =
    C(X,HAND)
1200 NEXT X
1210 RETURN
1220 'LOOK FOR THREE OF A KIND
1230 THREE(HAND)=0
1240 FOR X=1 TO 3
1250 IF C(X,HAND) <> C(X-1,HAND) AND C(X,HAND) =
    C(X+1,HAND) AND C(X,HAND) = C(X+2,HAND) AND
    C(X,HAND) <> C(X+3,HAND) THEN THREE(HAND) =
    1 : IF HIGH(HAND) < C(X,HAND) THEN
    HIGH(HAND) = C(X,HAND)
1260 NEXT X
1270 RETURN
1280 'LOOK FOR FOUR OF A KIND
1290 FOUR(HAND)=0
1300 FOR X=1 TO 2
1310 IF C(X,HAND) = C(X+1,HAND) AND C(X,HAND) =
    C(X+2,HAND) AND C(X,HAND) = C(X+3,HAND)
    THEN FOUR(HAND)=1 : IF HI(HAND) < C(X,HAND)
    THEN HIGH(HAND) = C(X,HAND)
1320 NEXT X
1330 RETURN
1340 'LOOK FOR A STRAIGHT
1350 SRT(HAND) = 1
1360 FOR X=1 TO 4
1370 IF C(X,HAND)+1 <> C(X+1,HAND) THEN
    SRT(HAND)=0
1380 NEXT X
```

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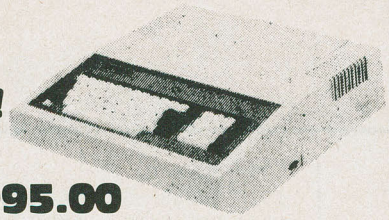

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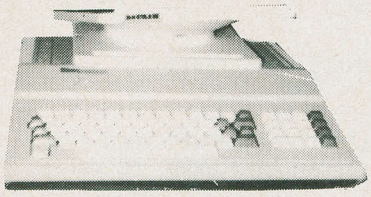

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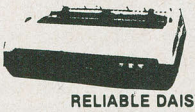

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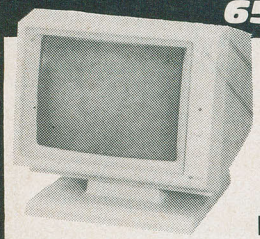

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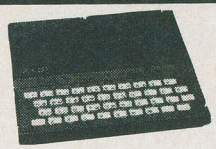

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```
1390 RETURN
1400 'LOOK FOR FLUSH
1410 FLUSH(HAND) = 1
1420 FOR X=2 TO 5
1430 IF RIGHT$(C$(1,HAND),1) <>
     RIGHT$(C$(X,HAND),1) THEN FLUSH(HAND) = 0
1440 NEXT X
1450 RETURN
1460 'CLEAR MESSAGE
1470 PRINT HM$;STRING$(22,LF$);STRING$(79," ");
1480 RETURN
1490 'WHO WON?
1500 WINNER = 0
1510 IF GAME(1) > GAME(2) THEN WINNER = 1
1520 IF GAME(2) > GAME(1) THEN WINNER = 2
1530 IF WINNER <> 0 THEN 1560
1540 IF HIGH(1) > HIGH(2) THEN WINNER = 1
1550 IF HIGH(2) > HIGH(1) THEN WINNER = 2
1560 IF WINNER =1 THEN WIN$ = "I WIN!!!!" :
     POT(1) = POT(1) + BET(2) : POT(2) = POT(2)
     - BET(2)
1570 IF WINNER =2 THEN WIN$ = "YOU WIN... " :
     POT(2) = POT(2) + BET(1) : POT(1) = POT(1)
     - BET(1)
1580 IF WINNER =0 THEN WIN$ = "DRAW. ALL BETS
     CARRIED..."
1590 WIN$ = WIN$ + "   YOU HAVE $"+STR$(POT(2))
     + "   I HAVE $" + STR$(POT(1))
1600 GOSUB 1460 : PRINT HM$; STRING$(21,LF$);
     TAB(PD) WIN$;
1610 BET(1)=0 : BET(2)=0
1620 RETURN
1630 'COMPUTER ANALYSES ITS HAND
1640 DR=0
1650 DR=DR+1 : IF DR>2 THEN 1880
1660 HAND=1
1670 GOSUB 1070
1680 GOSUB 1400 : IF FLUSH(HAND)=1 THEN 1880
1690 GOSUB 1340 : IF SRT(HAND)=1 THEN 1880
1700 GOSUB 1280 : IF FOUR(HAND)=1 THEN 1880
1710 HIGH(HAND)=0 : GOSUB 1220 'LOOK FOR THREE
     OF A KIND
1720 IF THREE(HAND)=0 THEN 1780
1730 GOSUB 1160 : IF PAIR(HAND)= 1 THEN 1880
1740 X=1
1750 IF C(X,HAND) = HIGH(HAND) THEN X=X+1 : GOTO
     1750
1760 GOSUB 2010
1770 GOSUB 1070 : GOTO 1650
1780 'WE HAVE, AT BEST, TWO PAIR
1790 GOSUB 1160 'LOOK FOR PAIRS
1800 IF PAIR(HAND)=0 THEN X=1 : GOSUB 2010 :
     GOTO 1650 'GARBANZO
1810 IF PAIR=2 THEN 1850
1820 X=1
1830 IF C(X,HAND) = HIGH(HAND) THEN X= X+1 :
     GOTO 1830
1840 GOSUB 2010 : GOTO 1650
1850 IF C(1,HAND)<>C(2,HAND) THEN X= 1 : GOSUB
     2010 : GOTO 1650
1860 IF C(5,HAND)<>C(4,HAND) THEN X= 5 : GOSUB
     2010 : GOTO 1650
1870 X=3 : GOSUB 2010 : GOTO 1650
1880 RETURN
1890 'COMPUTER DETERMINES ITS BET
1900 HAND=1
1910 GOSUB 900 'SEE WHAT IT'S GOT
1920 BET(HAND)= BET(HAND) + 7 + (10*GAME(HAND))
     + INT(RND*9)
1930 PRINT HM$; STRING$(13,LF$) "I bet $";
     BET(HAND);
1940 RETURN
1950 'GET PLAYER'S BET
1960 GOSUB 1460 : HAND=2
1970 PRINT HM$; STRING$(21,LF$) TAB(PD) "Your
     bet";
1980 INPUT BET$
1990 BET(HAND) = BET(HAND) + VAL(BET$)
2000 RETURN
2010 'DEAL ONE CARD
2020 J=INT(RND*51) : IF DECK$(J)="XX" THEN 2020
2030 C$(X,HAND)="XX" : SWAP C$(X,HAND),DECK$(J)
2040 RETURN
```

This subroutine does what is called a bubble sort. Bubble sorts are a crude but simple way for ordering data. Basically, you take a stack of information and scan through it. Any time the program finds that two entries are in the wrong order, it swaps them and sets a flag to say that its done something. When it gets to the end of the list, it looks at the flag and if it has been set, goes back and scans the list again.

As soon as the flag comes back unset it knows that the list has been sorted completely and that further passes through it won't change it any.

Having ordered the cards in a hand . . . you'll find that they are always displayed sorted . . . the program can look for the things a human checks out in a poker hand. The criteria for these start at line 1160. When broken down these things are extremely simple, and are nothing more than looking for occurrences of patterns in the cards.

Sounds a bit like reading the tarot, this.

Making the computer analyse its own hand so it will play an intelligent game is a bit trickier because it has to look for the existence of incomplete patterns. More to the point, it has to manipulate its hand so as to avoid chomping the patterns it already has.

In fact, this program plays a fairly simple game. You can easily add some nuance to it if you want but . . . be warned . . . as you get the machine more sophisticated in the way it deals with its own hand, the code begins to grow like something green and namelsss from the swamp. Furthermore, it will beat you a lot.

Wild Cards

I can think of few things more satisfying in life than taking an innocent computer and teaching it some bad habits. While many computers instinctively avoid strong drink, making one gamble is relatively simple. The one at work has been thoroughly corrupted by now, and very often will tell people who call the bulletin board at night to stop reading messages and "shut up and deal".

However, it does lose gracefully. It doesn't heave its cards on the table and kick over the furniture. It takes its defeats like a true pile of silicon and fiberglass and only starts to pound its tube against the wall, sobbing hysterically, once it's sure that everyone else has either left the room or powered down. **CN!**

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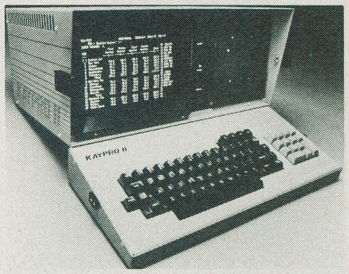

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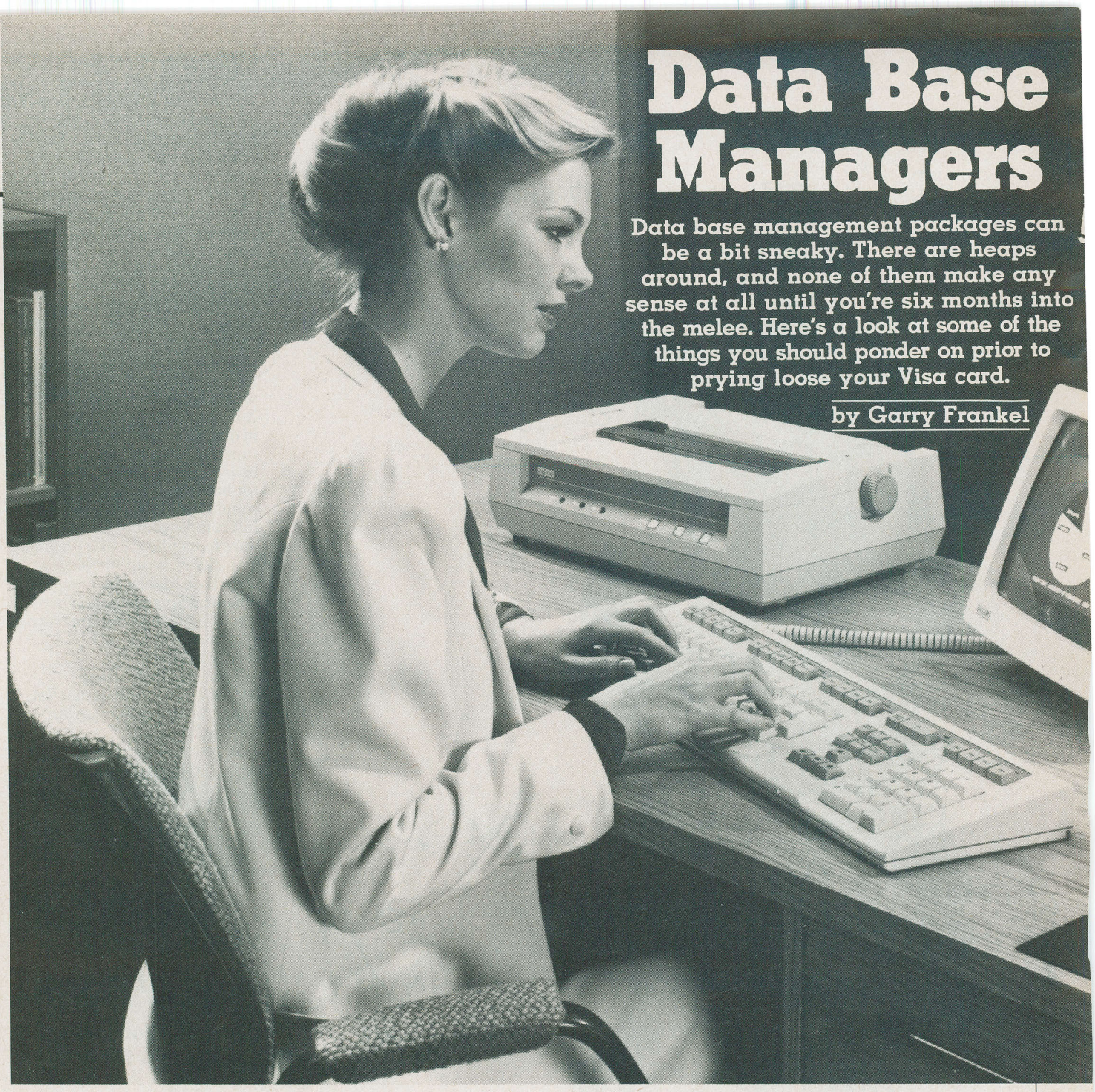
Data Base Managers

Data base management packages can be a bit sneaky. There are heaps around, and none of them make any sense at all until you're six months into the melee. Here's a look at some of the things you should ponder on prior to prying loose your Visa card.

by Garry Frankel



Have you ever found yourself surrounded by mounds of paper while you spend hour after hour going through all kinds of data just to find the one piece of information you want? Perhaps you are the secretary treasurer for your club or church group and you are tired of keeping all your membership lists by hand, writing on envelopes for mailings and flipping through cards to see who is behind on their membership dues.

Do you spend one day a week tallying up your sales reps' work and commissions so that they get paid on time?

If you can answer yes to any of these questions... or anything sounding remotely like them... then you are the kind of person who can benefit greatly from having a microcomputer with good database management software. You may have already figured this out. Your problem is likely choosing an appropriate package.

Up until about a year and a half ago there was not very much to choose from. If you owned a CP/M based system then dBase II was about your only hope. If you owned an Apple there was PFS. While a bit restrictive this did serve to keep things simple.

There are now about a hundred different brands of software available that are designed to help you keep track of data. What we are going to do in this article is to describe the different attributes of such software and explain the different technical terms that are used to describe these programs. We will not be listing all the software available, but we will try to give you the tools so that you can go out and make an intelligent choice of where to lay out your long green.

The Hardest Part

Let us start this examination with a definition of the term *database*. Because I'm writing this we will use my definition, which is as follows. A database is a collection of information that has some kind of form or structure. If the task you have in mind is not amenable to having the data structured in some way then you will have a tough time

finding any system that will help you. If the facts you wish to organize and manipulate can be put on some kind of form, then you're actually about half way there.

Unfortunately, it's the easy half.

To explain how a database is structured, I will use the old filing cabinet example. If you kept all the records of your club in one filing cabinet then this would be your database. In this filing cabinet you might have different file folders. One might be your master mailing list of members, another might be the records of membership dues and fees. You might also have separate files for all the special projects your members participate in.

We usually call these folders *files* in database talk. Within each file are sheets of paper, one for each member or what have you. These sheets are called *records*, each sheet being a separate record. On each record sheet we have blanks into which we put specific information. These blanks are known as *fields*.

In essence, then, a database consists of files of information. Each file contains separate records and each record is made up of several fields.

Software manufacturers usually call this type of software by the initials *DBMS*, which stands for data based management system.

We can break DBMS programs into two basic types. The first grouping would be what I call list or file managers. List managers are simple programs that let you easily store and retrieve information. Most allow for some kind of printout that make them good for keeping simple mailing lists and such. Very few of the programs in this category will allow you to do a lot of intricate math or to access more than one file at a time.

The second group of software is usually called *Relational DBMS* programs. I deem a DBMS to be relational if it lets you access more than one file at a time. For example, you can enter data into a file and instead of having to look up all of a member's data and then re-enter it by hand into a new form, you can just enter the membership number and the program will go and look up their information and enter it for you. You would then add the other data that is unique to the file you are working on. These programs are usually much more sophisticated than file managers and often allow for some fancy math and string handling functions.

DISKourse

Almost all DBMS programs store their data in one of two ways. *Variable length records* allow you to store data on diskettes by only taking up as much room as the information you entered required. The most common way of doing this is to have the program place a comma between fields and a carriage return at the end of each record. If this were placed on your screen it might look something like

Smith, John, 12
Mystreet,Anola,MB,ROK-1BO(MJ)

Fixed length records, on the other hand, will always take up as much room on the disk as you have allowed for on your input screen. Some systems just insert blanks while others will pad the data with a character such as a zero. For example, if you had defined the last name field as taking up to twenty spaces and allowed up to fifteen for the first name the file record would look something like this...

Smith——————————————-
John————————————12 Mystreet

The advantage to variable length records is pretty obvious. You can allow for a potentially long entry and end up using only as much disk space as is actually used. The advantage to the fixed length records is that it is easier and faster to find a given item of information because the software does not have to read each character to find the commas so that it can know where the fields separate.

There are now about a hundred different brands of software available to help you keep track of data ...

Record storage methods will obviously affect the way you use a particular DBMS, specially if you have limited disk capacity. Most programs will also have other limitations. These include an absolute maximum number of characters per field, a maximum number of fields per record, a maximum number of records per file and a maximum number of files per database. The popular dBASE II package, for example, will only allow thirty two fields per record and allows only two files to interact at a time. For some problems this can be severely limiting.

Almost every type of DBMS you can buy today, makes use of what are known as *index* fields. These index fields, or just indexes, are what allow you to find data very quickly without having to get your computer to read every byte in a file to find the record you want. When you define your record form you will designate one or more fields to act as your *key* index.

If you think of that club membership list and if we assign each member an individual membership number, then we can use the latter for a key index so that by typing in the membership number you will get that record onto your screen or printer pretty fast.

You might think of indexes as being little files that orbit around your big files. When you want to find something in a hurry

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MORTGAGE This is a very fancy mortgage amortization program which will produce a variety of amortization tables.

NSBASIC Large disk BASIC packages, such as MBASIC, are great . . . and very expensive. This one, however, is free . . . and every bit as powerful as many commercial programs. It's compatible with North Star BASIC, so you'll have no problem finding a manual for it.

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Data Base Managers

Much of the power of data base is in letting individual users manager their own information

your computer only has to read through the index file and in that file will be a pointer to the record in the big file.

Indexes are very important things because most DBMS systems use their indexes to decide the order in which data is sorted and stored. This can be crucial later on when you decide to design some kind of report that summarizes or prints out the data you have stored.

Indexes and Outdexes

There are important differences in the way that different software packages use index fields. Some allow you to only use one field in an index. This would mean that you could only sort your data by one parameter. Others allow several fields to be put together to form one key. They would usually assign each field a different level of importance in the sort order. For example, if you wanted to print out your club membership first in postal code order then by last name, then you would need an index that had postal code as first priority and then last name as second priority. Your printout would then look something like table one.

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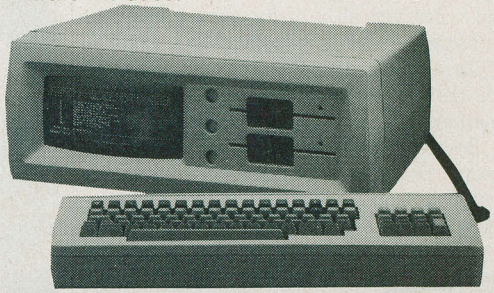

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Data Base Managers

P.CODE	NAME	ADD	MEM NO
R2W-1B6	ALLEN,G.F.	123 ANYWHERE	4632
R2W-1B6	SMITH,J.	234 NOWHERE ST	1234
R2W-2C3	MILLS,T.	567 FAROUT BAY	6789
R2W-4T9	JONES,P.	1-23 ASH AVE	5678

Table 1

This could be very handy if you had a large mailing list and you wanted to print mailing labels in order of postal code so that you could take advantage of bulk postal rates.

The other problem that arises regarding keys is in how many the system allows you to keep for each file at a time. For example, if your package only lets you keep one index file for each data file then you would have to re-sort your entire database with a new key index in order to have a report that puts stuff in the order you want. On the other hand if the software lets you keep several key index files for each data file then you need only sort out a new key file and not have to re-sort your whole data base. Sorting out key files is much faster than sorting a whole database.

Finer Points

Now that you have an idea of the basic differences to be found in DBMS software we can take a look at some of the more subtle features that you might want to include in your purchasing decision.

The first extra feature you might wish to consider is the ease by which you can program your system. Many of the best packages are actually programming languages that you must learn in order to get the things you want done to work. Other systems have menu-like structures that eliminate the need for you to learn a new language or to generate code yourself. Most... but not all... of the most powerful and flexible systems do require you to take up this tedious task. It is still much easier than having to write the whole thing in something like BASIC or PASCAL.

Some systems, like dBase II, have accessory programs that let you just run through a menu to set things up. The accessory program then takes care of writing the code. One of my favourite packages is called Infostar by Micropro. This program lets you type stuff on the screen, just like you were using a word processing program, and then it generates all the code to make the program run the way you want. This has enabled me to set up new applications in a matter of minutes instead of days.

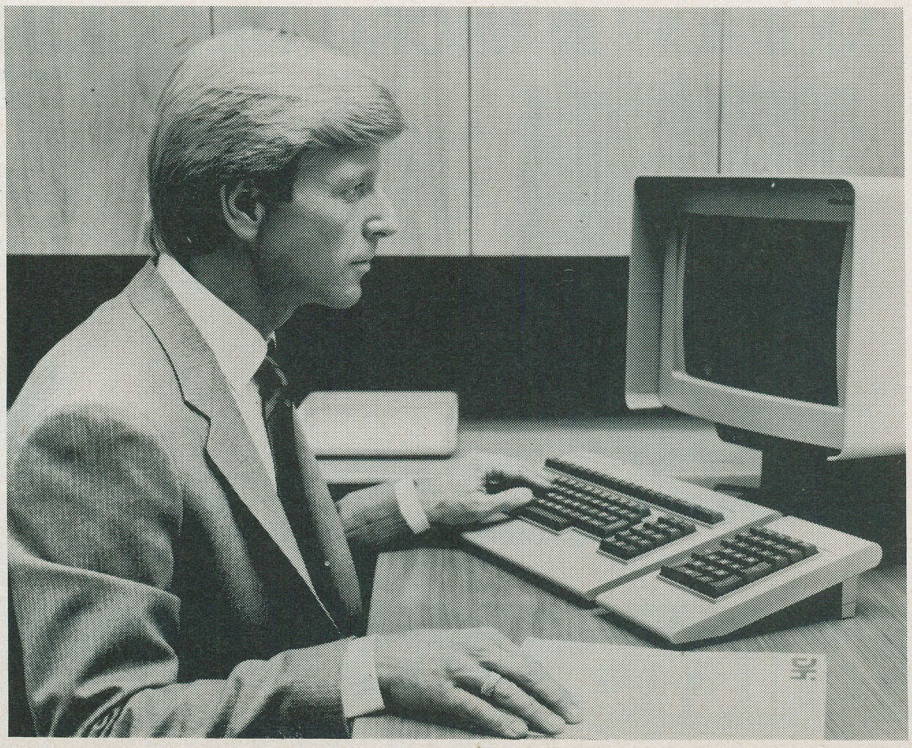
Many DBMS programs give you the ability to define how the data is entered and what data is allowed to be entered in which fields. For example, if you have a phone number field then you don't want people entering letters instead of numbers. Many systems will let you specify that in this field you can only enter numbers. Some systems get very fancy and let you place edit masks over fields so that you can define what is allowed into each separate space within a field, including different kinds of punctuation marks.

A good report generator is another very important tool in a DBMS. I once heard a wise sage say that "the data is only as good as your ability to get it out and fool around with it." The same criteria that apply to the files and data entry apply here. Some report generators are relational and allow you to use several files at once for input into your report. Others have limits on the number of fields they allow and how big each can be.

The ability to do most mathematical calculations, Boolean logic and string manipulation can increase the usefulness of your reporting. If you don't like listening to your printer clattering away then make sure the package you buy lets you run reports on your CRT as well as on your printer.

No matter how much we try to plan ahead when we set up a database, we always seem to have to add or subtract a field at some point down the road. With some of the less sophisticated programs on the market you could be stuck retyping all your old data into a new form. That is probably not what you had in mind when you decided that a computer should save you time and hassle in solving your data management problem. The solution is to make sure that you buy a package which will give you some way to change your mind later on. You must be able to have your computer move the data around so that it will fit the new form.

In a business situation, it is not uncommon to need the ability to have someone enter data on the computer and then to feed that data into your main file at a later time. This is called *batch processing*. You may want to have someone go over this data as it is merged to be sure that it is correct. This is called *batch verification*. If such is the case then be sure that this feature is available before you hand over your beaver skins to the salesman.



The Final Printout

In summary, I would say the really important things to consider in choosing a database package are the size and number of fields the thing will handle, whether the software is relational or a file manager, whether the data is stored as fixed or variable length records, the number of index files the system permits for each data file, the amount of control the user has over the field data types, the complexity in setting up a database and finally what the package costs and how much support is available to its users.

As I have stated before, my bias is towards a certain package because I use it a lot and know how to make it dance to almost any tune I want. That doesn't mean that it, or any other program, doesn't have drawbacks. They all do and what you have to decide is what do you want the system to do and can you live with the flaws of the system that comes closest to doing what you want at the price you will pay. It is a tough choice but if you know what questions to ask you will save a bundle of frustration later on.

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Turbo PASCAL

One often sees advertisements for amazing language packages. Thirty or fifty dollars will bring you this unspeakably advanced Pascal, C, BASIC or other compiler which has splendid documentation and runs so fast that several laws of physics are violated on every compilation. Here's a look at one of these... which actually does what it says.

by Brian Greiner

I love Fortran.

There, it's down in print for all to see. I've tried other programming languages, but Fortran remains my favourite. For one thing, it's easy to use. But best of all, it's a compiler . . . that means the final program runs quickly. And the documentation, in the form of books and standard libraries, is second to none. I will admit that it does have certain weaknesses, but it was my first computer language and none have ever been able to take its place.

Real Programmers use Fortran.

Yeah, but . . . There was this ad in a magazine that said "Send us your $49.45 and we'll send you a super hot Pascal plus a spreadsheet program written in our implementation." Well, I've always wanted to see how a spreadsheet program is written, so I sent them my money. A couple of weeks later, the post awful brought a package to my door.

Ripping open the package, I discovered a book called the "Turbo Pascal Reference Manual" . . . a real book, this, printed on good quality paper stock and bound. This was accompanied by, of course, the inevitable floppy disk. I put the floppy into my system, read the bare minimum of instructions and decided to compile the spreadsheet program.

The results, and my ensuing forrays into the powers of Turbo Pascal, were a general re-assessment of what you can actually get through the mail for fifty dollars.

Turbulence

The first thing I had to do was to run an installation program to tell the compiler what sort of terminal I had. Seems that there was a WordStar like editor built into the compiler which had to be installed, much as does real WordStar. I was beginning to wonder what this was leading up to. Like I mentioned earlier, I didn't read too much of the book at first . . . real programmers don't need documentation.

Eventually I started up the compiler itself and got a shock. A menu appeared on the screen! Well, I followed the instructions that came with the spreadsheet that told me what to do and after a brief interlude of disk crunching a COM file was spit forth. The spreadsheet worked fine but I didn't play with it too much, as the compiler itself had caught my interest . . . despite my deep rooted conviction that FORTRAN was the only language suitable for real programmers.

It turns out that Turbo Pascal is actually a totally interactive programming environment. Within this environment, one can edit, compile, run and save programs. If an error is found during compilation an error message comes up and the user can then go into the editor mode directly to the spot where the error occurred. This makes debugging, at least at the compiler level, wonderfully easy.

The editor itself is modelled after WordStar, and produces a standard CP/M file with a carriage return and a line feed after each line. If desired, the editing commands can be modified during the installation process.

The transcript of a session in figure one gives some idea of what the Turbo Pascal programming environment is like. The program is an example from the reference manual. It doesn't really show what using the system on a CRT is like, though . . . especially the interactive facets of the editor.

As well, note that the compiler has several options. It will put the compiled file directly into memory, generate a COM file on disk or generate an overlay type file. The arrow shows which compiler option is in effect. Compiling into memory is the fastest of the three and is useful for a quick check of a program.

The editor uses most of the standard WordStar commands including cursor control, block commands, insert and delete

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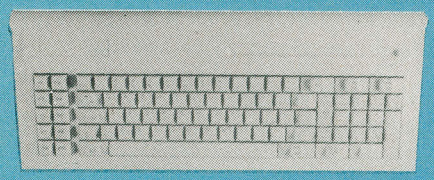

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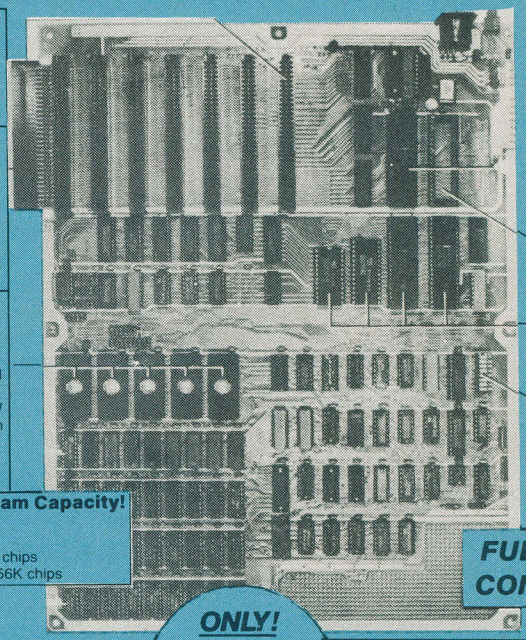

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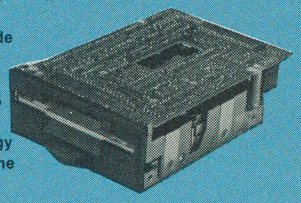

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Turbo PASCAL

Figure 1

```
B0>turbo
Turbo Pascal version 1.00 [CP/M-80, Z80] - Serial # $$$$$$$$$$$$
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ADM 3A


Include error messages (Y/N)? Y

Loading B:TurboMSG.OVR Logged drive: B

Work file:
Main file:

Edit    Compile  Run   Save                          <=== the menu

eXecute  Dir     Quit  compiler Options

Text:   0 bytes (7714-7714)
Free: 19441 bytes (7715-C306)

> C
 compile -> Memory                    <== note the various
                Com-file                          compiler options
                cHn-file

Find run-time error  Quit

> Q
 Logged drive: B

Work file:
Main file:

Edit    Compile  Run   Save

eXecute  Dir     Quit  compiler Options

Text:   0 bytes (7714-7714)
Free: 19441 bytes (7715-C306)

> E                                          <== edit mode

Work file name: first       <== pre-written file
                                                    default file
Loading B:FIRST.PAS                      type is .PAS

 program Box;
 var
   I: Integer;
 procedure DrawBox(x1,y1,x2,y2: Integer);
   var I: Integer;
   begin
        GotoXY(x1,y1);
        for I := x1 to x2 do write('-');
        GotoXY(x1,y1+1);
        for I := y1+1 to y2 do
        begin
          GotoXY(x1,I); Write('!');
          GotoXY(x2,I); Write('!');
        end;
        GotoXY(x1,y2);
        for I := x1 to x2 do Write('-');
  end;   {of procedure DrawBox}
begin
  ClrScr;
  for I := 1 to 5 do drawBox(I*4,I*2,10*I,4*I);
  DrawBox(1,1,80,23)
end.
                                                  <== ^k^d to exit

> Logged drive: B

Work file: B:FIRST.PAS
Main file:

Edit    Compile  Run   Save

eXecute  Dir     Quit  compiler Options

Text:   536 bytes (7714-792C)
Free: 18905 bytes (792D-C306)

> Q                                          <== end of session
```

commands and find and replace. It requires that the entire program being edited be loaded into memory. This restricts the size of the program being edited to the amount of free memory space available . . . but there are tricks to circumvent this restriction.

The first trick is to break the final program into chunks and integrate the chunks during the compilation. This is done using the "I", or *Include*, command. This option allows the user to create libraries of frequently used routines that can be easily referenced by other programs.

The second trick is to use the CHAIN and EXECUTE commands to execute other programs from within a Turbo Pascal program. The CHAIN command can only execute programs compiled with the cHn file compiler option . . . see the sample session. Variables can be shared between the current program and a chained program. The EXECUTE command is used to execute any COM file, but data cannot be shared as in chained programs.

. . . closely follows the standard Pascal defined by Jensen and Wirth . . .

Turbo Pascal closely follows the standard Pascal defined by Jensen and Wirth in their book "Pascal User Manual and Report." There are a number of extensions to enhance the usefulness of standard Pascal, including bit and byte manipulation, direct access to memory and data ports, dynamic strings, free ordering of sections within the declaration part, full support of operating system facilities . . . for example, the CP/M user is allowed access to the BDOS . . . in-line machine code, random access data files, type conversion functions, absolute address variables, *Include* files, program chaining with common variables and structured constants.

Hardware and Furniture

My first exposure to Pascal was with standard Pascal run on a large machine. Borland has turned a mediocre megacomputer language into a useful tool for microcomputers.

The manual, as mentioned earlier, is a soft bound book. It has two hundred and sixty pages, a good index, lots of examples and is extremely well written. Although it is meant as a reference manual and not an introductory text, quite a bit of how to program in Pascal can be learned from it.

The version of Turbo Pascal which I use is for CP/M-80 but there are implementations available for Apple CP/M, CP/M-86, Concurrent CP/M-86, MS-DOS and PC-DOS. The cost for any version is $49.94 US.

There is one catch in all of this. To quote the licensing agreement, "The license is limited to using Turbo Pascal for development of programs for use on one CPU only . . . It is thus illegal to give away or resell Programs developed using the Turbo system..." For those that wish to give away or sell programs utilizing object code generated with Turbo Pascal, there is a one time fee of one hundred dollars U.S. There are other makers of compilers that demand a royalty for each copy of a program written in their language sold and others that charge thousands of dollars as the one time fee so I suppose that a hundred dollars isn't too out of line . . . except that Borland's ads do *not* mention that the compiler is sold for use on a single computer only and that a fee is required for the sale of programs.

As it stands, even putting a copy of a program's compiled object code in the public domain would, strictly speaking, be illegal.

However, for the single user who wants to write programs for his or her own applications, Borland's Turbo Pascal is an excellent product, with lots of useful features. I'll even go so far as to say that real programmers use FORTRAN and Turbo Pascal.

Turbo Pascal is available from Borland International, 4807 Scotts Valley Drive, Scotts Valley, California, 95066 **CN!**

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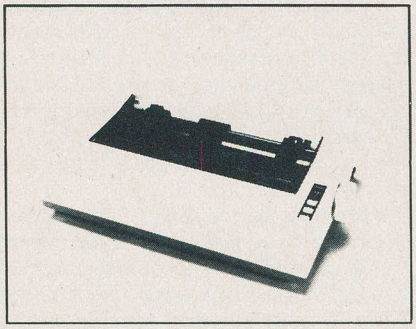

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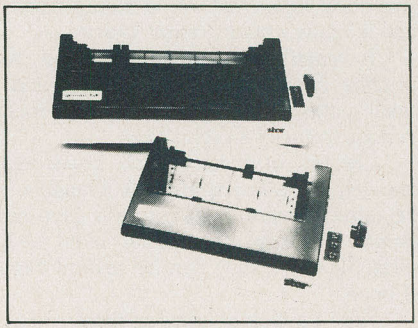

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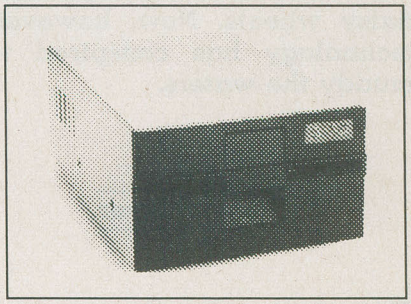

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The New Printers

Printers used to be extremely dogmatic... you had a choice between cheap and nasty matrix beasties and high class daisy wheels. Now, however, technology has conspired to muddy the waters.

By Kevin Fraser

If you had enough money you could go and buy, oh, a laser printer or one of those huge page deals that can defoliate half of Quebec in a single afternoon of gobbling paper. However, one of the tenets of micro computers is the efficient use of one's resources and, as such, one always winds up looking for peripherals which do as much as possible for the bucks splurged.

A while ago it was pretty well required that one choose between the two basic styles of printer. You could have a fast, moderately expensive... but ugly... dot matrix machine or a slow, extremely expensive daisy wheel that would output type actual humans wouldn't mind looking at.

It wasn't uncommon to have two printers if one could afford them, and a small cottage industry grew up around various forms of switch boxes.

Owners of those switch boxes may once again have a spare jack available, as the latest printers to spring forth have new aspects to them that make them a bit schizophrenic... they can be several things at once.

Here's a look at a few of them.

Type Casting

A fully formed impact printer gets its name from the way it makes a character on paper. This is essentially the same technique a typewriter uses. Daisy wheel printing looks exactly like a typewriter's.

Dot matrix print looks like a coarser version of the character display on your video screen. While it's become acceptable for use between "inside staff"... and other computer users... it looks mass produced and rarely fails to make real humans think that you're mechanical in some way.

Figure one shows some samples of what the print from one of the latest generation of dot matrix printers looks like. Just reading through this type of print once will fool most people into thinking it was done up on a typewriter.

This is what the ads call "letter quality dot matrix."

Most dot matrix printers have a little bit of software on a small ROM in their innards. The reason for this is because the designers of such things, themselves true computer freaks at heart, saw that with the arrangement of printer pins they had to work with, they could make the printer do the letters in many different ways.

By changing a few parameters in the algorithm that forms the characters, the machine can come up with compressed or expanded letters, sub or superscript letters, italics, bold print, underlining, or almost any combination or permutation thereof. It will even do true proportional spacing if told to do so. Proportionally spaced type is set up

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The New Printers

so that each letter takes up only as much space on the line as its width justifies, so that you would get quite a few more characters in a line of "i" characters than in one made up of, say, "m". Proportionally spaced type looks a lot nicer.

The new dot matrix letter quality printers are actually smart enough to do the proportional spacing themselves. All you have to do is tell the printer in advance that you want it to justify the text you're going to send it, tell it the length of line you want it justified to, send it the line of text and it will figure out how many letters should go in each line and so on, inserting the correct number of microspaces to "pad" the line out to the length you specified initally.

Many letter quality dot matrix printers have what are called letter quality and draft quality print modes. Draft quality is actually a compromise that allows you to get the document printed out quickly when you are more concerned with the time it takes to finish than with the appearance of the print.

Draft quality is essentially a dry run of the final printout that can be done at high speed with no frills. It's unspeakably handy if you are doing a table or chart or something that has to be carefully formatted, and you need to test the way it looks on paper. In draft mode, the Toshiba P1350 printer will do one hundred and sixty characters per second. Although it won't look like a typewriter did it, you'll have it on a scroll right quick.

Having proofed and otherwise looked at your draft, you can edit your text files and run it all through again, this time in letter quality mode. This looks nice, although the work will take longer. The P1350, for example, goes at a hundred characters per second.

This is an example of 10
This is an example of 12 pitc
This is an example of 15 pitch
This is an example of PRESTI(
0123456789ABCDEFGHIJKLMNOPQR:
This is an example of CO
0123456789ABCDEFGHIJKLMN
All 96 ASCII characters
Block Graphics Character
High Resolution Dot-addr
subscript, superscript,
boldface, underline

Figure one. Various letter quality (letter quality) fonts.

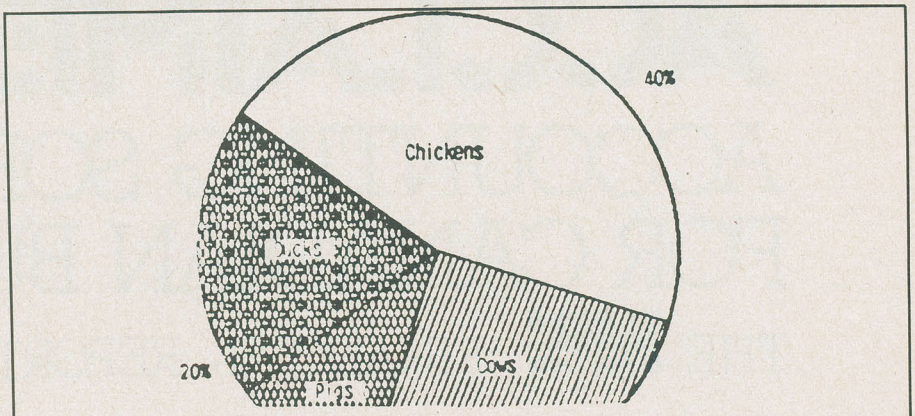

Figure three. A semi intelligent application of dot addressable graphics.

A Bunch of Flowers

Even with all the advances in dot matrix printer quality these days, there are still those diehards who insist that the only way to get real daisy wheel quality print is to use a real daisy wheel printer. The alternative would be a typewriter, except that typewriters don't score very well in the high tech department.

However, anyone who uses a word processor for routine correspondence will tell you that there are times when it's just plain quicker to type up a label, or a list, or anything short and sweet and one shot like that, without having to use the word processor to create a file and print it out.

A printer is a typewriter that takes orders from a computer, instead of a keyboard. However, there are a rash of new printers available that can be convinced they are actually typewriters in disguise. You can use these things as either manually operated typewriters or computer driven daisy wheel printers.

There are several variations on this theme. The most common systems are daisy wheel based, like the Smith Corona *Ultrasonic III Messenger* and the Olivetti *ET 351*. However, there is also a dot matrix system from Brother, the *EP-22*.

The Smith Corona Messenger is a typical dual perspective printer. It has a well engineered keyboard, even by a typist's standards. It is a correcting typewriter, which means you can back up to the place on the paper where you made the mistake, white it out and then type over it with just a few keystrokes... without having to breathe the mind altering fumes of liquid paper. It uses replaceable daisy wheels so its print fonts can be changed to suit the occasion. It does very crisp looking print.

-24.5	-21.8	-18.9
-9.8	-8.7	-7.5
-14.7	-13.1	-11.3

Cashflow Impact

Figure two. Draft quality print at one hundred sixty characters per second.

There are a few peculiarities inherent in this sort of machine. Having evolved from a typewriter, is features a typewriter's character set. So, for example, it can't do greater and lesser than symbols, substituting a one half symbol and cents for these codes. This would be a bit of a drawback in, say, printing BASIC listings.

The basic design components are pretty much the same regardless of manufacturer. One generally needs an interface between the computer and the printer... this may take the form of an external box or a card inside the printer itself. There'll be some mechanism for telling the machine what you want it to print from... the computer or its own keyboard. The SCM accepts control P as a toggle for this function, although some of the printers have a mechanical switch.

The Brother dot matrix printer typewriter probably deserves some mention. At the very least it's unique. It runs on AC power or four flashlight batteries, and has a two K RAM buffer, allowing it to do things like repeat the same letter over and over again. If you are using it in its typewriter mode there's a fifteen character liquid crystal display in there to permit one's type to be eyed before it lands on the page.

While small and convenient, the Brother does lack some of the finesse of the larger machines. Its dot matrix type is extremely coarse, and doesn't provide for true descenders... the little tails on lower case letters that hang below the base line.

Brother also has a rather extensive line of typewriters that can be convinced they are printers. The higher end of the spectrum includes such beasts as the EM–80 which sports options like cut sheet and tractor feed mechanisms. Their CE–70 machine sports eight kilobytes of memory and an optional disk drive. Both of these machines can be connected to somebody's computer with an optional printer interface.

Olivetti has also stepped into the typewriter printer arena with their 'ET' line of office products. Their basic line of printing machines all have civilized keyboards and an interface that's installed inside the machine by your dealer. These are pretty ample devices that include two communications channels.

Olivetti also has an under one thousand dollar daisy wheel printer called the *Praxisprint*. It offers print in ten, twelve and fifteen characters per inch, a maximum line length of eleven inches and a print speed of twelve characters per second. Its purchase price includes Centronics, RS–232 and Commodore 64 compatible interfaces all in one box.

End Of Job

You may be thinking about a dual mode printer for economic reasons... many of the cleverer ones can save you a lot. One of the typewriter printers might solve a desk space problem. The extreme flexibility of the letter quality dot matrix machines often appeals to hobbyist users... there's just so much in there to meddle with.

As the cost of printers has decreased and the competition for a place in the maelstrom of computer shops has gotten nastier we've seen a lot of innovation like this. To be sure, it hasn't ended yet. However, there has never been a better time to go shopping for a printer. You don't *have* to settle for something that doesn't quite meet your requirements if you don't want to.

For information on printers in this article, contact

Irwin Electronics (Toshiba),
165 North Queen Street,
Etobicoke, ON,
Canada,
M9C 1A7

Brother International Corporation,
1515 Pitfield Boulevard,
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29 Gervais Drive,
Don Mills, ON,
Canada,
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C64 Peripheral Survey

By itself, the Commodore 64 seems to hold up fairly well, but stuff its I/O ports with some peripherals and you'll not only have a better machine, but it'll be waterproof as well.

The Commodore 64 has come a long way since its introduction in 1982 as a more memory efficient alternative to the VIC-20 with no software and a fairly hefty price tag. At present, software abounds, its price is in the four hundred dollar range, and a great deal of peripherals are now available to correct hardware ommissions or generally enhance the machine in general.

Naturally, I/O is important to any computer and generally strengthens the computing power the machine affords the user. Pointing devices, like light pens, graphics tablets and joysticks offer an alternative to keyboard-user interaction. Eighty column cartridges make word processing a pleasure, and a CP/M option brings an entirely different operating system to 64 owners.

This survey, then, encompasses most of the useful additions one can make to one's 64.

Commodore 1541 Disk Drive

Description
A single sided drive that formats disks at thirty-five tracks of between seventeen to twenty-one sectors per track. Formatted disk capacity is one hundred and seventy K. The 1541 contains a microprocessor and a two K RAM buffer.

Manufactured By Commodore

Available From
Local Commodore dealers

Price
$399.95

MSD Super Disk Drive

Description
An alternative to the Commodore 1541. The drive's disk controller has its own microprocessor. Formatted disk capacity is one hundred and seventy-four K. Disks are formatted at thirty-five tracks of between seventeen to twenty-one sectors per track.

Manufactured By MSD

Available From
International Marketing Services, Inc.

Price
$650.00

MSD Super Dual Disk Drive

Description
This disk drive offers two drives in the same package. Both drives can operate independently, or as a single unit. The formatting and microprocessor are similar to that in the single drive unit.

Manufactured By MSD

Available From
House of Computers, Inc.

Price
$1095.00

Koala Pad

Description
As a graphics tablet, the six by eight inch Koala Pad provides a four inch by four inch drawing area. A plastic stylus accompanies the tablet, as does "The Micro Illustrator", a utility graphics program. The Commodore version of the program allows copying selected portions from one picture to another, and an "undo" feature. Other programs supporting the Koala Pad are available.

Manufactured By
Koala Technologies Corporation

Available From
Mr. Software

Price
$110.00

Commodore Joystick

Description
The Commodore joystick has five bubble switches; four directional and one under the fire button. The "stick" is covered with a synthetic rubber coating for comfort.

Manufactured By Commodore Computers

Available From
Electronics 2001

Price
$19.95

Wico Command Control Joystick

Description
Wico joysticks have six leaf-type molded switches and two switch selectable fire buttons. This standard model provides a long, bat handle grip with smooth action.

Manufactured By Wico Corporation

Available From
Mr. Software

Price
$29.95

Cardkey/1

Description
A separate sixteen key pad that plugs into a joystick port. Each key is programmable, either in values or strings. A "calculator" mode is offered where it is unnecessary to type PRINT before making an on-screen calculation.

Manufactured By Cardco

Available From
Computer Workshops Limited

Price
$69.95

Wico Three-Way Deluxe

Description
This joystick offers a choice in hand grips. Three are supplied including the standard and the power grip handles. As above, two fire buttons and six switches are inherent.

Manufactured By Wico Corporation

Available From
Mr. Software

Price
$39.95

Wico Command Control Trackball

Description
A phenolic ball allows three hundred and sixty degree movement in this game control unit. The device itself isn't much larger than one's hand. One fire button is provided in its upper left hand corner.

Manufactured By Wico Corporation

Available From
Mr. Software

Price
$34.95

BusCard II

Description
An improved version of the BusCard, the BusCard II has a parallel and serial port, as well as a slot for cartridge software. The BusCard adds extended BASIC and a machine code monitor to the Commodore 64, as well as the capability to switch from PETASCII to ASCII.

Manufactured By Batteries Included

Available From
Batteries Included

Price
$195.00

C64 Link

Description
The Link allows the Commodore 64 to transfer data from any device to another, be it serial, parallel, or IEEE. BASIC 4.0 is resident, and the Link gives the 64 a machine language monitor.

Manufactured By Richvale Telecommunications

Available From
Richvale Telecommunications

Price
$185.00

Cardboard/5

Description
The Cardboard/5 is a five slot expansion bus for the 64. The unit is fuse-protected, has twenty-two L.E.D.s for status indication, and is completely switch selectable. A reset button is provided.

Manufactured By Cardco

Available From
Computer Workshops

Price
$109.95

Data 20 Z-80 Video Pak

Description
The Z-80 Video Pak offers the 64 both eighty columns and the option of a CP/M operating system. SB80, written by Lifeboat, is inherent in firmware. At present, over fifty CP/M programs are available for this cartridge including WordStar and dBase II.

Manufactured By Data 20

Available From
Computer Workshops Limited

Price
$399.00

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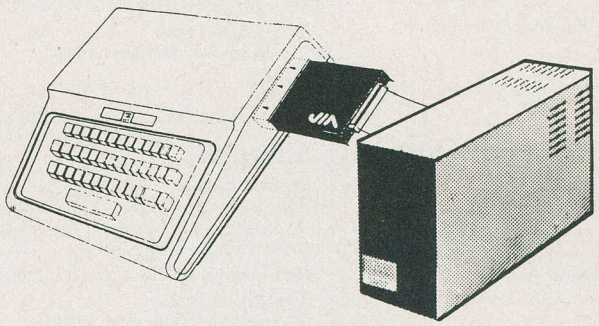

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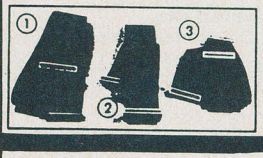

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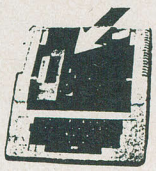

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C64 Peripheral Survey

B.I. 80

Description
The B.I. 80 column adaptor has a hardware switch for easy forty to eighty column switching. It supports the 1701, 1702 or monochrome monitors, and can be used with a number of word processors. BASIC 4.0 is also included in the firmware.

Manufactured By Batteries Included

Available From
Batteries Included

Price
195.00

Handic Vic-Switch

Description
Up to eight 64s can be attached to the Vic-Switch when multi-user capabilities are desired. All computers can access the same printer or disk drive. Also compatible with the Vic-20.

Manufactured By Handic Software ab, Sweden

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Circle No. 14 on Reader Service Card

Data 20 Serial Interface

Description
This interface provides true RS-232 levels. L.E.D.s show if the printer is hooked up, if the data buffer is full, and if data is being transmitted. DIP switches are provided for printer configuration.

Manufactured By Data 20 Corporation

Available From
Computer Workshops Limited

Price
$99.95

Interpod

Description
The Interpod allows any number of serial, parallel, or IEEE devices to 'talk' to each other without protocol problems.

Manufactured By Oxford Computer Systems

Available From
Computer Workshops Limited

Price
$199.00

Edumate Light Pen

Description
A light pen that connects to the 64 via a joystick port. The unit has a lengthy coiled cord and comes with three software programs.

Manufactured By Futurehouse

Available From
Infomag, Inc.

Price
$40.00

Card/&G

Description
With this parallel interface, PET graphics may be printed on a non-Commodore printer, and hexadecimal dumps are possible from the 64.

Manufactured By Cardco

Available From
Computer Workshops Limited

Price
$149.95

Cardriter/1

Description
A light pen with an on-barrel switch. Software is included in the purchase price.

Manufactured By Cardco

Available From
Computer Workshops Limited

Price
$69.95

Data 20 Video Pak

Description
An eighty column board, the Video Pak provides a software switch from forty to eighty columns. A word processor, spreadsheet and mailing list program accompany the hardware.

Manufactured By Data 20

Available From
Computer Workshops Limited

Price
$279.00

1541 Express

Description
The 1541 Express provides a high speed port between the Commodore 64 and the 1541 disk drive. Typically, LOADs and SAVEs are performed two to four times faster with this interface. The Express can also be used as a parallel drive interface with a minor modification to the 1541. The device is turned on or off with a two key command.

Manufactured By Richvale Telecommunications

Available From
Richvale Telecommunications

Price
N/A

C-1600 Modem

Description
A direct connect originate only modem that comes with a cassette-based terminal program, and a free hour and password on CompuServe.

Manufactured By Commodore Computers

Available From
Computer House

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Card/&B

Description
A centronics parallel interface that is compatible with all standard Commodore 64 print commands. Graphics are not supported.

Manufactured By Cardco

Available From
Computer Workshops Limited

Price
$99.95

Acoustic Modem

Description
A low cost, originate only acoustic modem for the Commodore 64 or Vic-20.

Manufactured By
Computer Workshops Limited

Available From
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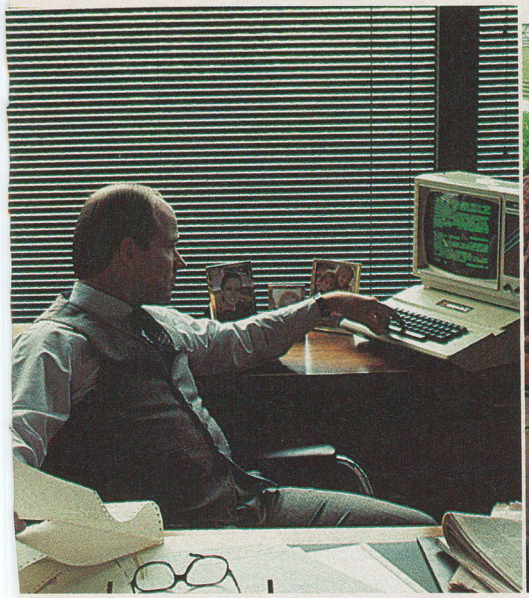
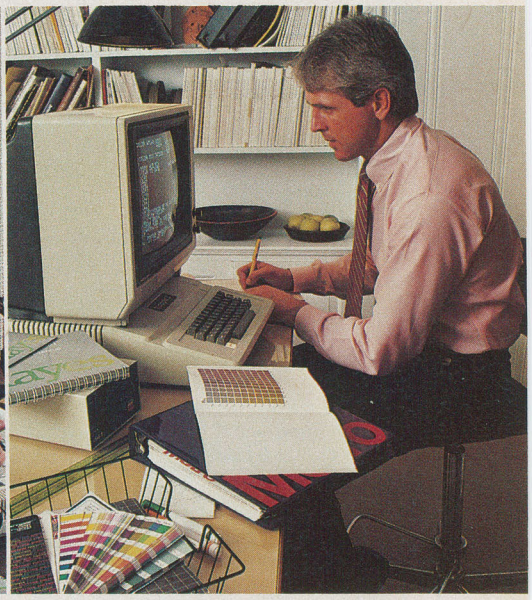


"Thanks for the prompt reply. Sure was a lot faster than waiting for the mail!"

"Gary: The pedigrees for next week's auction are as follows..."



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Discover how Micromodem IIe can help maximize the capabilities of your Apple. While Smartcom I software will minimize *your* efforts.

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Morrow Review

The Morrow MD11 combines some fairly well debugged technology with extremely sophisticated, well human engineered software. The result is a powerful system with an unusually rich array of features.

by Steve Rimmer

It's interesting to note that, while almost all of the high end business computers to have been released of late have been IBM compatible machines, there are still a few CP/M based boxes coming out. What makes it worth looking at is that the power of these new computers is, for some applications, actually greater than that of an 8088 based machine. Despite the apparent restrictions of filthy old prehistoric eight bit chips, some of these newer computers can access a quarter megabyte, run at six or eight megahertz and blast away at their disks with unparalleled speed.

The Morrow MD11 is one such beast. It uses a Z80A to think with, one hundred and twenty eight kilobytes of memory to hold its resultant thoughts and an eleven megabyte hard disk to ultimately place them in the files of destiny. There are also three RS-232C serial ports in there, one Centronics type printer port, one RS-422 high speed serial port... we'll get to all this in a second... and a double sided double density floppy drive. It runs the new and improved CP/M 3.0 or CP/M Plus.

It's only recently that the advertising agencies, so long responsible for marketing paper towels and tooth brushes, have been turned loose on software products.

In addition to all of this the Morrow comes with large fuming piles of software. Included is NewWord... which is essentially Wordstar with some cosmetic changes... Correct-It, a spelling checker, the LogiCalc spreadsheet package, Personal Pearl to manage data bases, Quest to balance the books, MBASIC, BAZIC, which is a version of Northstar BASIC, PILOT, some disk utilities and a very powerful menu structure.

However, one of the things that makes the MD11 a bit unique is that it does not come with a screen and keyboard. While experienced users may be able to converse with it using a doorbell and a light emitting diode jammed into one of the communications ports, most will need a terminal. This is, essentially, a keyboard and monitor package which can send characters to and from the MD11 over the communications port. See the March '84 edition of CN! for an explanation of what these things are all about.

The whole mess, when flung together in the same room, is a really splendid little machine. The extent and nature of the splendor follows.

Three's Company

The operating system of the MD11, CP/M 3.0, is what gives the machine a great deal of its character. While it can behave in much the same way as normal CP/M 2.2, it has a number of additional features.

To begin with, it allows the Z80A to actively utilize the eighth of a megabyte of RAM in the system. Software which tries to access the upper sixty four K block causes the operating system to do the bank switching required. As such, much of the software really thinks it has all that memory to play with.

This much RAM makes quite a number of the limitations which are inherent in sixty four K machines pretty meaningless. Most of the memory hungry applications one finds on micros, like spreadsheets and such, seemed to be unstoppable on the Morrow.

Users who are familiar with CP/M 2.2 will find that most of the same commands do much of the same stuff on version three. However, if you aren't into all this technical stuff you don't have to worry about PIPs and STATs and the like because the Morrow comes with... PILOT!

Now, if you've been following Computing Now! you'll have read Doctor Evans' article in the August '83 issue and will be wondering what it has to do with CP/M 3.0. Well, in fact, the answer is that it nothing to do specifically with it, but that there are some pilot programs included with the Morrow system that do. In fact, for reasons not fully explained in the volumnous documentation which comes with the system, the Morrow comes with an implementation of the PILOT language and a number what it calls *co-pilots*. There is a school of thought which has it that they came up with the co-pilot idea first and picked the language 'cause it let them use this clever name.

When you first boot the MD11 it runs one of its co-pilots... which sets up all the software. This means that it takes each of the major packages and installs it to your specifications. It even puts your own personal name in Personal Pearl. Ah, well, it does if you tell it what your name is, anyway. I hadn't cracked the manual by the time I got to this aspect of things so that when it asked me my name I did what any normal denizen of a government oppressed society would do. Personal Pearl thinks I'm King Arthur of the Britons.

This installing co-pilot takes about five minutes to do all its stuff but it saves days of the software installation drudgery that usually accompanies getting a new computer. As we get them on a rate of about one a month, it was really splendid to watch the whole ordeal stream by unattended.

The Morrow is, unquestionably, the easiest system to get up and running of anything we've seen thus far. Its hard drive comes stuffed with software, its installations are all androidal and when they've stopped twitching it launches you into... another menu.

The main co-pilot is booted upon powering the machine at any time other than the first run. It's menu driven, giving you access to the large software packages, the system's utilities and low level functions and, if you feel a need to, to CP/M itself. While it can be disabled for seasoned users, it's actually a great deal more user friendly than anything the little pointy arrow prompt could ever do for you.

For example, to move a file from the hard disk to the floppy drive from the menu one would simply select the utility sub-menu, the file movement option and enter the file name and its destination. At the CP/M level you'd have to use PIP with all its file specs and toggles. CP/M 3.0 PIP has rather more toggles than one might be used to using.

What You See

One of the finest aspects of using the applications software which comes with the Morrow is not in the software at all. It's a function of the way the computer is structured to deal with reality.

Most micros are, in fact, a computer and a terminal in one, and most computer users never have to make the distinction between the two. The MD11 is just a computer. It has no screen or keyboard... but it does have a serial port to hook a dedicated terminal to.

Terminals are really wonderful things. Even fairly inexpensive ones will generally have orders of magnitude better keyboards and screens. As such, the Morrow is a really decent thing to work at. In addition to just being really slick, this separate terminal aspect of things allows you to select a terminal which you like the feel and look of,

The computer itself is the box with the disk drives. The keyboard and screen are actually the terminal.

Morrow Review

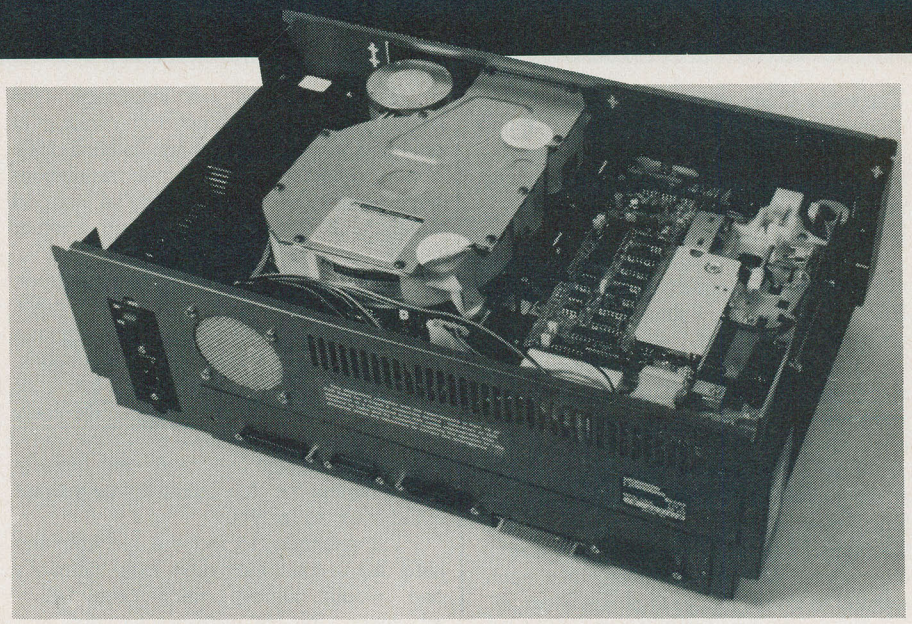


Table 1

The following are a number of terminals which are suitable for use with the MD11. Others will work as well... check them out for compatibility first, though.

Morrow MDT 60 and MDT 70
ACT 5A
ADDS Viewpoint
DEC VT52 and VT100
Hazeltine 1450 and 1500
Heath H19
IBM 3101
Lear Siegler ADM 3A, ADM 5, ADM 22 and ADM 31
Qume 102
SOROC IQ 120
Teleray
Televideo 910, 912, 920, 925 and 950
Visual 200
Wyse

rather than being stuck with what the boys at the factory felt was state of the art.

Morrow, of course, does make a terminal, and you can get the whole thing in one shot if you like their stuff. Table one lists some of the other options.

The first thing I tried on the Morrow after the disks stopped spinning was the NewWord word processing program. It's extremely like WordStar, inasmuch as all the same control codes apply to it and it acts in very much the same way as WordStar. As the story goes it was done by an ex-alumnus of Micropro, the company that does real WordStar.

The disk organization of the Morrow is such that the disk has sixteen user areas. These are simply file designations... if you say that a program is in USER 1 it can only be seen if you are logged into user area one. The system uses this feature to keep the disk directories of the hard disk down to a manageable hugeness. All the applications programs are in USER 0. The next three hold the files generated by NewWord. Higher user areas are given over to files from the other applications packages.

If you sit in front of the Morrow with NewWord running and pretend you are using WordStar you will virtually never make a mistake. The commands are identical. NewWord may be somewhat faster... it's hard to say if the relatively snappy response of the computer is a function of the software or the machine itself. However, to be sure, everything WordStar can do can be handled by NewWord at least as well.

There are a few advantages to the program, primarily for the new user. The menus are a lot less cluttered, for one thing. However, what really does it for NewWord is its immense manual.

The manual which comes with WordStar is a turkey of the first rank. If you are halfway into computers before you start with the thing you can learn the software entirely from the menus, which is probably for the best. If you are bit lost, WordStar's book will send your brain into a lower astral plane.

NewWord's manual is quite the opposite. It's excellently done, explains everything you want to know, walks you through things fairly painlessly and even has a decent index. There's a thick glossary of terms at the back, too, which makes looking stuff up pretty simple. For more advanced users the book provides source code for the patchable areas of the program exactly as does Wordstar version 3.0.

Figure 1

```
*MENU1
CLRS:
T:          MAIN MENU
T: This menu is your road map through the
CP/M
T: operating system. To perform these func-
tions
T: just enter the appropriate number.
LF:1
T:      1. NewWord
T:      2. LogiCalc
T:      3. Correct-It
T:      4. Personal Pearl
T:      5. Quest
T:      6. MBASIC-80
T:      7. BAZIC
T:      8. CP/M tutorial menu
T:      9. Create working diskette
T:      U. Utility menu
T:      ESC. Exit to CP/M
LF:1
T:      Enter your selection
A:
M:1
JY: *NEWWORD
M:2
JY: *LOGICALC
        etc...
```

Multilinguistics

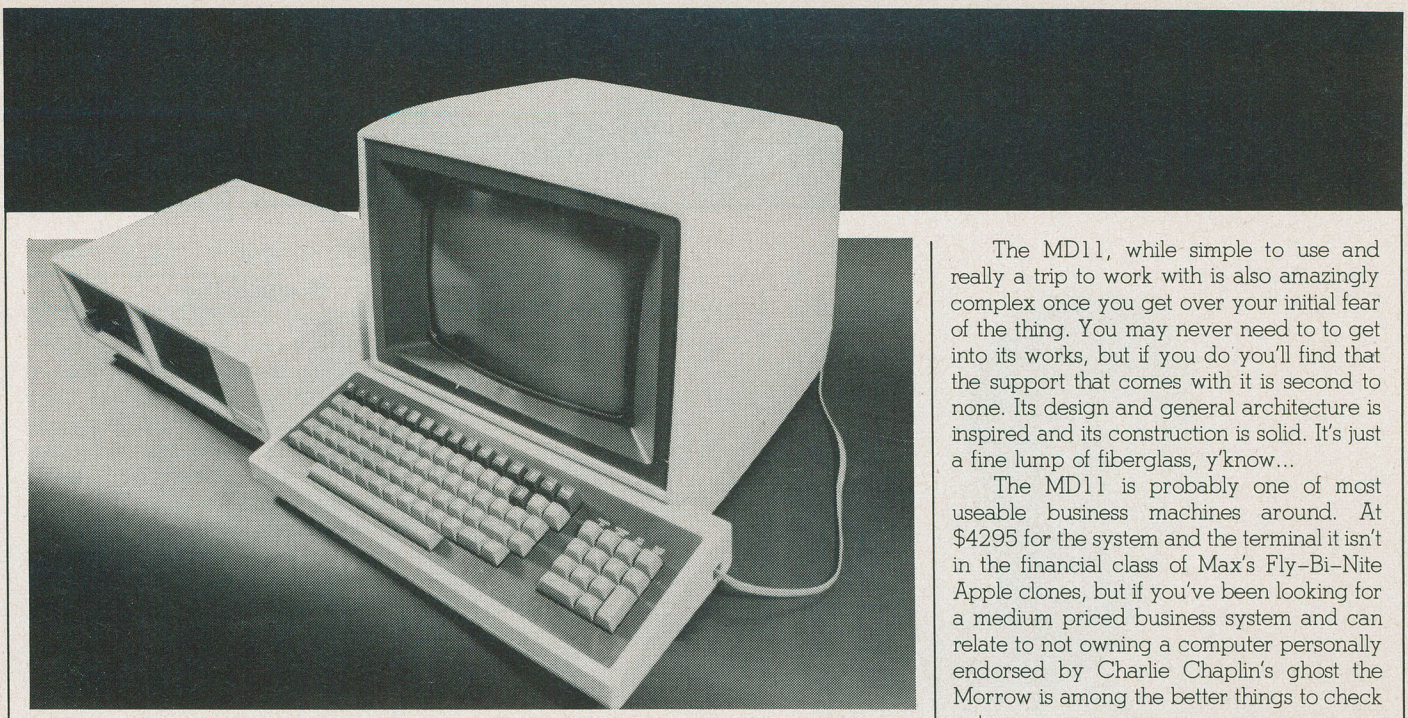
The MD11 system comes with three programming packages.. four if you count the CP/M ASM assembler. The most common of these is MBASIC, or BASIC-80 from Microsoft. It is a very powerful disk BASIC with all the good stuff expansive BASIC packages are meant to have in them. It comes with a very good manual exactly like that of every other system which comes bundled with MBASIC.

Microsoft BASIC, however, is considered by many users to be slimy and unworthy and, as such, the Morrow package offers alternatives. The first is Micro Mike's *BAZIC*... complete with a Z. While still a BASIC interpreter, it has a number of marked differences from old BASIC-80.

The most important advantage in using BAZIC over MBASIC is that the former is written to run on a Z80 rather than an 8080, as is the case with MBASIC. To get technical for just a moment, a Z80 is a newer and niftier chip which supports all software written for the older 8080. However, if you write code using the additional features of the Z80 you get much faster, tighter stuff... although it won't run on 8080 based systems.

BAZIC, then, is one of the fastest BASIC interpreters available. It is, in fact, an implementation of Northstar BASIC, which, of course, means that it won't run MBASIC style programs without modification. However, it is an interesting and powerful language with many facilities the Microsoft implementation just doesn't provide. It also lacks some that it does... you gives and gets in these things.

Finally, we have PILOT. This will be the weirdest of the three for most users. PILOT is essentially a language for educators.



While not ragingly powerful it does program easily and quickly.

In fact PILOT is one of the simplest things in the world to write code for. It is an interpreter like BASIC... although it has no line editor, so you must compose your PILOT programs with the word processor, just as in the case of compiled languages. Its syntax structure is insanely simple, with everything being hung on input and output.

PILOT is the ideal thing to write menus in. Figure one shows some of the code used in one of the Morrow's menus. The symbol T: means to type the line, analogous to the BASIC PRINT. If you can't write programs in PILOT you have probably crashed your brain ages ago.

This all means that the system is profoundly flexible without being laden with complexities. Using the PILOT manual which comes with the Morrow even programaphobes will be able to word process themselves new menus or alter existing ones. Thus, for example, if you buy new software for the system you can go in and add it to the menu.

Furthermore, and perhaps most important, you can actually say you know how to write programs... in a dialect few of your friends are likely to know.

Morrow Morrow Morrow Your Boat

There's actually quite a lot more that could be said about the MD11. However, when one encounters a phrase like this in an article one can be pretty sure that it isn't going to be.

The MD11, while simple to use and really a trip to work with is also amazingly complex once you get over your initial fear of the thing. You may never need to to get into its works, but if you do you'll find that the support that comes with it is second to none. Its design and general architecture is inspired and its construction is solid. It's just a fine lump of fiberglass, y'know...

The MD11 is probably one of most useable business machines around. At $4295 for the system and the terminal it isn't in the financial class of Max's Fly-Bi-Nite Apple clones, but if you've been looking for a medium priced business system and can relate to not owning a computer personally endorsed by Charlie Chaplin's ghost the Morrow is among the better things to check out.

Argh, Billy...wake up me lad... the PILOT's drunk an' there be menus all over the mizzen mast...

The Morrow MD11 and other decent computer-like phenomena are available from Micro Bazzar, 23 Westmore Drive, Unit 5, Rexdale, Ontario 1-416-745-4740. The system is also available without its terminal. The terminal costs roughly six hundred and twenty-five dollars. CN!

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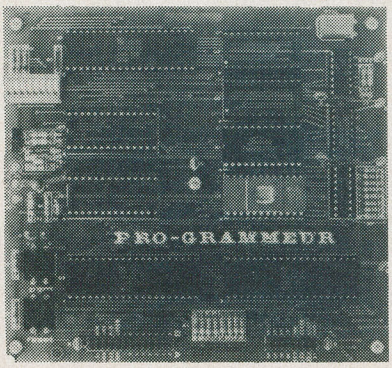

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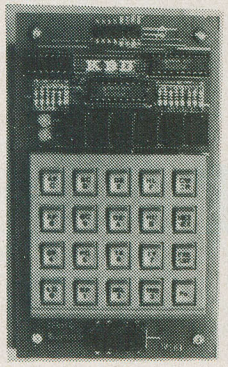

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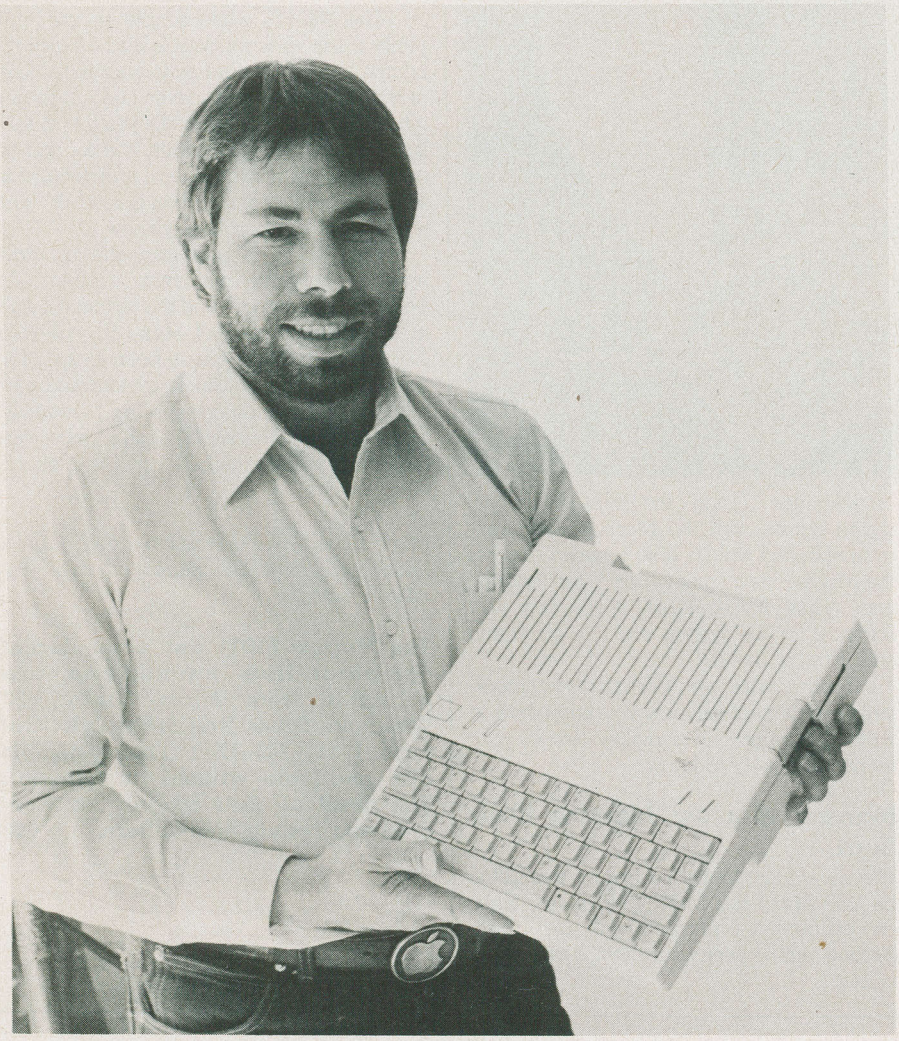
The Apple][Something



New Apples seem to be hurling themselves out of the orchard at a rate of about one a month these days. We actually got to talk to the great fruit picker himself about this one, though, a low priced sophisticated Apple II.

by Steve Rimmer

The King Edward hotel in Toronto is a really nice place. There's a clown out front with a top hat who opens the door for you, lots of marble everywhere and a variety of ashtrays to swipe in the huge lounge. The buffet is about ten bucks a head and, as it turns out, they won't let you leave a 1975 blue Chevy pickup in the parking lot.

At least, they wouldn't let me.

I don't smoke, so the ashtrays of the Ed never seemed to make it worth the trip. However, on this particular day we'd had a call from Bill and Ed of Apple Canada's public relations agency saying that one of us could come down and meet Steve Wozniak and talk about fruits.

Steve Wozniak is the guy who built the first Apple. Myth has it that it came together in his garage. As it turns out, the site was the floor of his apartment. However, even given this lapse in credibility this seemed like a really decent opportunity to get a free lunch and find out about the rumours of yet another new Apple soon to blossom forth.

The Two Something

The rumour went something along the lines of there being a new Apple coming out to be called the Apple IIc. In fact, as Wozniak sat at the large round table in his hotel room yarning about the history of Apple and the development of his newest fruit he refused to say what the letter after the name would be. It was the "Apple II something".

The new Apple, he said, was a development of a general rethinking down in Cupertino. Apple started out making the Apple II, and then the II+, and Wozniak maintained that a lot of the success of the company had been in that it had always supported its users. It had kept things compatible, so that Apple II+ owners, for example, would not be left behind by the introduction of the //e, and so on.

However, there had been some corporate hassles as the company grew. The Apple III was released, and, although technologically Wozniak felt it was superior to the IBM PC it never really sold. This was followed by the brilliant concept of Lisa. However, Lisa failed to do what virtually everyone at Apple felt sure it would manage, to wit, make inroads into the very high end micro market, the 'Fortune 500' companies which are traditionally ensconced in IBM hardware.

The new Apple, then, was to be a returning to the things that Apple did best. Wozniak said that a lot of Apple's efforts have returned to eight bit microprocessor based machines of late, and to expanding their capabilities. The Apple II something would be the first of a number of Apples designed both for the home and business markets.

Wozniak spoke of new technological developments like the 816 processor, a chip which was created largely at Apple's request. It incorporates the complete instruction set of the 6502 but also has a sixteen bit set. As such, a machine built around it could run Apple II+ software as a straight eight bit computer would. However, it could also be a sixteen bit system, with all the power of, say a PC, using the superset instructions.

Such a machine, said Wozniak, exists in an advanced state of development in Apple's research facilities.

Something Else

The Apple II something, however, was very real. As the discussions came to a close Bill produced a yellow vinyl carrying case which looked like it could spit forth a computer. 'This isn't to be released until the twenty–fourth of April.' he intoned. He went on to swear everyone in the room to secrecy and explained at great length what

would happen to Ed and himself should anyone fail to maintain his oath. With trembling hands he placed the new system on the table.

The new Apple looks a bit like an Atari that has been run over by a truck. It's extremely small and almost weightless. It has a full sized QWERTY keyboard, one hundred and twenty-eight K of RAM and a single five and a quarter inch disk drive set into its right side.

'When we first built the Apple II,' said Wozniak, 'we figured that it was this... carryable. Thing is, when you got the monitor and the drives and some software under your arms... You can take this machine around on a plane and plug it into your hotel room TV.'

The system is, in fact, surprisingly self contained. It uses about thirty chips to perform all the functions of the Apple II+ plus peripheral handling, having more custom logic than did the //e. Electrically it's very much like an Apple II+. However, there are no slots and most of the 'cards' are already in there.

You would use the new Apple exactly as you would a conventional one. The computer thinks that it has a printer interface in the memory space that would be slot one, a serial card in slot two, a disk drive in slot six, and so on. In essence, most of the Apple cards people usually buy are already hard wired onto the board... a slightly more sophisticated version of the enhanced Apple compatible systems which have emerged with fewer than eight slots.

The new Apple, then, has a built-in parallel printer interface and a serial port. There's one disk drive included and a connector to allow plugging in a second external drive. There's also an RGB output to allow the computer to drive a colour monitor in addition to the usual composite video jack.

The system has a number of clever features. Among these are switches on top of the case which allow one to switch between forty and eighty column screens and to select an alternate keyboard layout. This will be of interest to users who want to compute in foreign languages... the North American version of the system comes with the highly weird Dvorak keyboard as an alternate.

The system also features the Apple //e's double high resolution graphics, giving it a horizontal pixel count comparable with that of the IBM PC.

The new Apple will, among other things, be very low cost, said Wozniak, although he could not say what it would finally end up costing. It is intended for use by the home user who wants to apply a microcomputer to his or her activities. It is not an open system, like that of the traditional Apple II, so, while it is compatible with all existing Apple II+ and //e software, it offers no room for hardware expansion. 'If you want to plug in a music synthesizer or you want to be able to use the very latest printer interface card you should buy a //e.' Wozniak observed.

Twigs

As the first of a new harvest of apples the Apple II something looks to be a very impressive machine. It appears to be easy to use, well put together and vastly less massive and awkward than the traditional Apple doorstop. Wozniak has great hopes for it. However, as he explained, Apple has had expectations of its products in the past which have not materialized.

In the development of the Lisa, for example, there came the creation of a unique disk system called the 'twiggy'. It was going to allow a megabyte and a half to live comfortably on a five and a quarter inch diskette, and, with it, Apple would have had the most powerful disk drive available. The money tree was half defoliated to pay for its development but, by the time it came to use it, it was outmoded and the Lisa wasn't selling.

'We have this warehouse with thousands of Twiggy drives in it...' said Wozniak, smiling. 'I think we're gonna take them all and make them into a sculpture in the Apple complex somewhere.'

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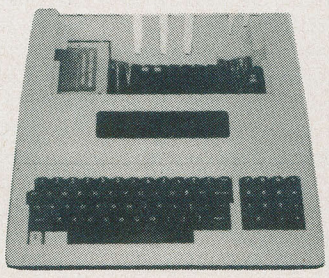

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Don't Shoot The Printer

Selecting a printer from amidst the throng of printers looking for homes is a bit like getting a cat from the humane society. Printers are no fun when you give them too much catnip, however.

by Steve Rimmer

If printers had wheels you'd swear they they were used cars 'cause all the people who have them and want to sell them seem to lie about them so often. Or, at least, they look to be out to confuse you. Don't you just love getting it home, getting it mired in its jungle of cables and having it spit air? You know that if you call the place you bought it from the guy will start with "...you didn't tell me you were going to put paper in it..."

Printers are fairly confusing. You probably bought your computer for fairly intelligent reasons... you *did* like the light-up keys, didn't you... but you will probably choose a printer on the basis of a combination of blind luck and witchcraft. That's okay, though... that's probably what they used to design it.

Printers are a heavy thing to get into all at once, which is why we put this article part way through the magazine.

Twins

Having at the basics, it should be noted that all printers do largely the same stuff. They make marks on paper. There are several approaches to this, which can be subdivided down into *practical* and *impractical*. Of the latter type, we have printers which are too expensive to contemplate, such as ink jets and lasers, and those which produce results which are substantially gross, such as teletypes and thermal printers. This leaves us with the former group which, not surprisingly, we're going to look at in this feature.

Practical printers come in two distinct groups, these being the daisy wheels and the dot matrix machines. Both work using the time honoured tradition of smashing metal or plastic shapes through ink encrusted ribbons onto paper. The differences are in how fast they work, how nice their type looks and how much they cost.

A daisy wheel printer is essentially a glorified electric typewriter... without the part where you actually do the typing. Instead, it has a computer interface so that the characters sent down the wire at the machine will make the print mechanism hammer the paper with the corresponding symbols.

The thing about printers that imitate typewriters is that their speed is entirely a factor of how fast they can select a character... that is, the time it takes for the thing's feeble brain to say "hey, I'm done with that letter... let's go get the next one..." and then actually bring the printing hammer... or whatever... to bear on the paper.

This fact did not escape the three-eyed

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Don't Shoot The Printer

hunchbacked gnomes that designed these things. They figured out that the shortest distance between two characters was invariably round, as circular things can move faster than linear ones. Thus, printing contrivances are frequently circular. To this effect we have the IBM golf ball, the printing thimble and, finally, the daisy wheel.

There's a photograph of a daisy wheel on our cover this month. Each "petal" of the flower has a letter on it. To print a character the printer revolves the flower 'til the petal it wants is straight up and then mashes it forward with a small electronic hammer.

Despite the speed at which a daisy wheel can spin, it is still fairly slow in terms of the number of characters the printer can select in a second. There are actual reasons for this, most of them greasy and mechanical, but the result of it is that low cost daisy wheel machines clatter along at anywhere from twenty-five charcters a second on down.

Dot matrix printers are more common than daisy wheels... largely because they are ultimately more useful for the things people use printers for. They produce characters in much the same way as your video monitor does... out of dots. A dot matrix printer will have a matrix of pins and a number of electric hammers to drive them. Internal logic selects the appropriate dots to form intelligible symbols.

Dot matrix printers, despite their apparent complexity, are cheaper to make than daisy wheels because most of their critical stuff is electronic rather than mechanical. Chips are cheaper than motors. However, more to the point, dot matrix machines are faster and more flexible.

Because of the way they work, dot matrix printers can clip along at a decent pace. The pins that impact with the print ribbon travel very short distances, and, as such, the time involved in printing a character is much shorter than that of a daisy wheel. More to the point, the time involved in selecting a character is entirely taken up in the internal logic of the machine selecting a character pattern from its memory... this is as close to no time as a mechnical thing can get. As such, dot matrix machines can buzz along at over one hundred characters per second without half trying.

The factors which determine the speed and attractiveness of dot matrix type are actually fairly closely linked. The quality of the characters produced by a printer is a factor of the number of dots in the matrix. A denser matrix will produce nicer type and... as is outlined elsewhere in this issue... a sufficient density can result in type which approaches the result of a daisy wheel printer. However, more pins also create more heat, and, as such, denser matrix printers must run slower.

The universe is like this. Maybe someone will come up with one that's water cooled.

There are other aspects of dot matrix printers, however. The patterns of pins that get selected are a function of bit patterns stored either in a read only memory or in programmable memory within the printer. This means that the bit patterns can be changed, at least in theory. In fact, many printers will allow you to "download" characters of your own design, thus permitting the printer to print whatever symbols you feel like having on the page.

At the same time, the printer itself can contain multiple character sets. By simply changing what bit of its ROM it is looking at for its patterns the thing can go from doing regular type to italicized type to underlined type and so forth.

Finally, if the printer is sufficiently clever it can be used to print high resolution images on its page. Again, it is simply a matter of manipulating the pins in its print head. In most cases, the printer will use only one vertical row of pins in its high resolution mode, traversing the page in increments of one dot rather than one character. The eight bit characters sent to the printer are interpreted, then, as being the eight bits which determine which of the pins in the one active row will strike the paper.

Shopping List

Having ploughed though all this theoretical stuff let us proceed to check out some of the realities of printers.

If you look at the results of a dot matrix printer and then at those of a daisy wheel machine you'll probably be able to decide which of these sorts of printers is suitable for your application. It's a pretty clear choice between class and practical considerations. Can you afford to wait for your printouts? Is anyone going to take exception to dot matrix printing? These and other questions...

These and other questions are your own problem.

The practical considerations in buying a printer are more easily gotten around. Most of them are things you never think of... and many won't come back to haunt you until long after it's too late to return the thing.

The most obvious approach to buying a printer is to choose the cheapest one you can find. Oddly enough, this isn't always the wrong thing to do. The cheapest printer we've come across is called the Gemini 10X. We have heaps of them here... they're not really very elegant printers, but they've proven to be reliable and they're actually pretty slick.

The Gemini printers point up a number of the things one should look to in choosing a printer. To begin with, they use teletype ribbons... those little two spool deals that cost anywhere up to a buck and a half and work equally well on printers and 1919 Underwood

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On the Cover:
Computers are moving into the offices of many small businesses all across Canada, and Radio Shack's Model 16 is proving to be a popular choice. The padded and chromed swivel chair on casters is pretty sharp, too.

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Computers In Small Business

From Computing Now! Magazine

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Portable computers have quickly become the businessman's friend; time that used to be wasted travelling or waiting for an appointment can now be put to good use. Here are the portables that are available in Canada. Page **15.**

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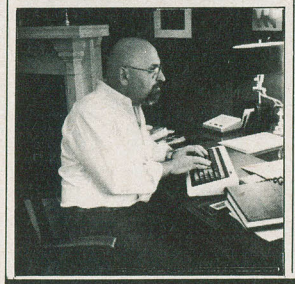

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Don't Shoot The Printer

typewriters. Now, they don't produce particularly clean looking type, but for printouts, memos, drafts and other such things they're more than satisfactory.

We have other printers. The huge dot matrix machine we use for doing financial spreadsheet printouts and other things that require the use of paper too large to be accommodated by the Geminis uses ribbons made of the same sort of material... but these come as easy to use drop in cartridges. They're convenient, a lot more elegant than the teletype spools... and they cost almost twenty dollars each. There's a lesson in this. If you are going to be using your printer a lot make sure you peruse the cost of the accessories.

Most dot matrix printers use some form of inked cloth ribbon. This is a *multiple strike* ribbon... it can be used over and over. Multiple strike ribbons don't die; they just fade away. However, even when they're new they don't produce exceptionally sharp images.

Most daisy wheel printers use *single strike* ribbons. This sort of thing is a long strip of plastic with ink on one side. Having once been struck, the ribbon will be transparent where the ink has come off it. Single strike ribbons do much nicer work, but they are much more expensive to use.

Printers deal with paper in two ways. The easiest is called *single sheet* feeding... you roll a sheet of paper onto the platten and let the thing print 'til it gets to the bottom, stop, put in another sheet and carry on. It's just like a typewriter.

For larger jobs, however, all this paper manipulation can be a drag. As such, there is tractor feed paper... long fan fold chains of perforated sheets with little holes along the side. This allows the printer to accept a continuous form and make sure that it feeds accurately even after it has spewed through quite a lot of it.

If you are going to do a lot of printing make sure you can get a tractor feed for your printer. Furthermore, make sure it works. Some of the really cheap ones grunch the paper after five or six sheets or whenever anyone burps too close.

Another tricky bit about tractors is that the spacing of the sprockets that tract the paper through the printer is, not surprisingly, quite important. On most printers one or both of these things can be moved so, for example, you can use regular tractor feed paper, narrow sticky labels or perforated continuous form letterhead simply by manhandling the sprockets a bit. Some don't allow for this. A while ago we aquired a really nice Epson printer which everybody fought over until it was discovered that it would only print on continuous form letterhead.

Finally, there is the unpleasant matter of interfacing the printer to your computer. This is a bit tricky because, as is so often the case, the standards of the interfaces were chosen by fate rather than the intelligent apes that make printers.

The easiest interface to deal with is the Centronics type parallel port. It's easy because vitually all equipment which has this interface is compatible. This is because the standard defines exactly which wires carry which signals and what voltage levels these signals are to be at.

Sadly, the standard omits a specification for the connector to be used.

Some computers and most printers use a large D shaped thing for this task and it has become something of a standard. However, this is not always true and it is very often the case that while all the signals are right, your system was designed by the same guys who did the matching printer. If you decided not to spring for the matching printer you will have to provide the interface yourself.

Virtually all equipment with the Centronics interface is compatible. . .

Making cable to go between two mutually exclusive bits of hardware is a painful task. Your computer dealer may be able to point you towards a company who'll do this sort of thing. Many people will not buy printers which need custom interface cables on ethical grounds, however, as the companies that make the cables invariably have to manacle their technicians to their benches to get the job done.

If you are contemplating the purchase of a printer which will not deal with the standard interface cables available for your computer make sure you can get the cable you need before you lay down your plastic for the printer.

The other sort of interface is the RS-232C serial port. Now, pretty well all of these things use the same physical connector, a small twenty-five pin D shaped device. However, the electrical variables are a killer.

To begin with, data flows over a serial port at a rate agreed upon by your computer and your printer. This is called the baud rate. If your computer sends data at a baud rate that's different from that which your computer is looking for you'll get garbage. Best see if your computer and your printer to be can be set at the same baud rate.

There is also the format of each character, called the *protocol,* to be considered. If these differ, once again, you get *garbanzo.* Some serial ports are designed to drive modems and some are designed to drive printers. While the difference between them is only the location of a few wires, using a printer on a modem port results in... no, actually, that will result in getting nothing at all on your paper.

Some printers want what is called XON-XOFF protocol. Such a machine will gobble characters until it's full, send an XOFF character to your computer to stop it from sending any more data until the printer's thirsty again and then send an XON to start things up again. It's hard monkeys if your computer can't understand these things.

Finally, many printers with RS-232C ports don't actually support the correct voltages to drive a true RS-232 port. Without getting into the grotty details, you may find that the printer is unable to tell your computer that it has received a character and is now ready for the next one. In other words, you'll get one character and then dead silence or a flood of them that confuses the printer, resulting in an interesting array of something that looks vaguely like trying to print a binary file.

Unless you're pretty good at hacking with computers... and sometimes not even then... there is no sure way of looking at a serial printer and *knowing* that it'll work with your system. If you pop for one of these things make sure that you can bring the little monster back to the place you got it if you take it home and it doesn't work.

This is not the same, by the way, as a guarantee that they'll "make it work". A technician without access to your particular computer will be hard pressed to adapt the printer to your system... no matter what the salesman says.

Scroll

There are a whole lot of good printers out there and almost none which are real turkeys. There will be, however, only a few which will suit your requirements. A heavy bit of thinking now will keep you from the dawning realization that you could have avoided all this six months into the future.

Above all else, only buy what you need. There are so many machines available that you should be able to come up with one emminently tailored to your application. Avoid getting bells and whistles you don't want to ring or blow... not only are they expensive, but they're that much more stuff to go wrong.

The great joy in the life of a printer is to go wrong. When you power the beastie and it says "My warrantee has just expired. You're on your own now." you can be sure it isn't going to be a good day. **CN!**

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Software Buccaneers

Argh, Billy ... let's go plunder some software. What's that ye' say? There's a mountie on the bridge ... shiver me timbers.

by "Jolly" Roger Allan

Admit it now . . . we've all done it at some point. We've all copied software without receiving Papal absolution (in advance). We've done it for any one of a number of reasons . . . we've needed an extra copy as back up, the devil made me do it by appealing to my innate larcenous streak, or why not . . . if the companies charge four hundred dollars for a disk that's worth only a few dollars, they must expect it. Figures as to how much software piracy goes on, vary from forty to ninety percent of all software programs sold, depending on who you ask. But the buccaneers among us may find that we may shortly be facing the pointy end of a naval officer's sabre. The powers that be are beginning to flex their muscles.

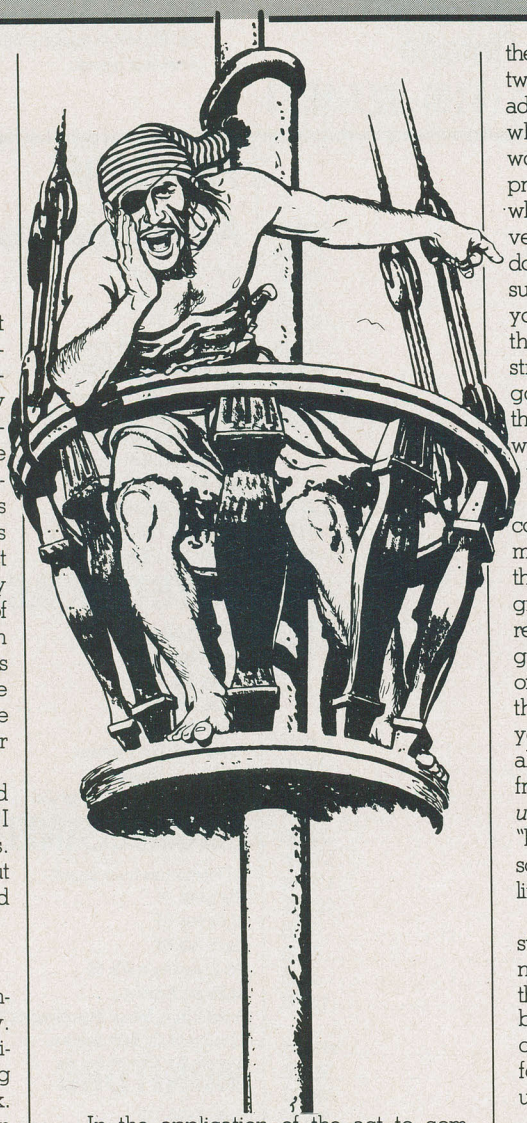
Where do we stand legally, that is. And more importantly, what can they do to us? I have a distinct adversion to thumb screws. We may not quite be on quicksand but we're also not on the pre-Cambrian shield either.

Legal Bits

There are essentially four points to be concerned with in viewing software piracy. These are the law as it stands, judicial decisions, the law as it appears to be being modified, and the high tech counter attack.

In Canada, the appropriate legislation is known, not surprisingly, as the *Copyright Act.* Enacted in 1921, it came into effect three years later and has subsequently been modified only once . . . to protect the then brand new state of the art technologies of player pianos and sound recordings. With typical governmental shortsightedness, our honest legislators failed to mention computers.

Under this act, protection is granted to a "literary work," and the "translations" of such. Further, the act specifies that any attempt to create a "contrivance" to circumvent the protection afforded by the specific articles of the act, will in itself be construed as a breach of the act as per those articles pertaining to the protection afforded "literary works" and their translations" thereto included in the body of the act. (No, I am not attempting to get into Osgoode, it just sounds that way).



In the application of the act to computers, one can very easily get into a labyrinthean maze . . . labyrinthean, that is, to a non-lawyer (and not so straightforward to a lawyer either). But being as succinct as one can, the act determines that in "human readable" form, software is a "literary work," and hence subject to protection.

Canada is a signatory to two international agreements governing copyright, these being the Universal Copyright Convention and the Berne Convention. The Berne Convention specifies that copyright automatically arises during the act of creation by the author and does not require notification or a mark of ownership. In other words, if you create it, it's yours; you don't have to tell anyone in any way that you own it. The other convention, the Universal Copyright Convention, does require a marker; the familiar c with a circle around it (©), the name of the copyright owner and the date of the first publication. Putting the two conventions together, if you are a Canadian and put the little circle thingy somewhere in your program, then your "literary work" . . . in "human readable" form . . . is protected in about a hundred countries which have signed either or both of the conventions. Further, you can formally obtain a document from the Department of Consumer and Corporate Affairs attesting to your ownership of a copyright. However, this costs and doesn't really beef up the strength of your copyright unless the matter goes to court . . . and then only, as an aid to the judge in deciding when the "literary work" was composed. Further, it is not pretty enough for framing.

Putting it all together and applying it to computers, if you are a Canadian and have marked your work with a copyright symbol then the copying . . . piracy . . . of your program *is* legal since it is not "human readable," but if the copier uses the program generating a "human readable" form of it, you can nail him or her for breach of the act. Putting the shoe on the other foot, if you make a copy of a commercially available program, say from a floppy disk from a friend, you are in the clear. However, if you *use* it, producing a print out or some other "human readable" image, say on a video screen, then legally you're at sea in a leaky lifeboat.

However, "for the purposes of private study, research, criticism, review or newspaper summary," Article 17(2)(a) of the act precludes the user from penalty for breach of the act. In other words, if you copy a program, a "literary work", and use it for any one of the above five purposes, your use does not constitute breach of copyright.

This raises the difficulty *vis-a-vis* copying a software program for "private study" or "research." For example, if a person were to copy from a friend a program he or she had purchased which provided a means of, say, analysing the stock market, and used it at home to so analyse the stock market and bought and sold stocks based on the analysis, would the person be in breach of the act? On the one hand, it could be considered a breach, due to the program having generated a "human readable" form of it, but on the other, the "human readable" form was generated for "research" and, arguably, also for "private study." Which way the courts would jump on this one remains unclear.

An analogous situation, though perhaps a more comprehensible one, involves schools and books. Nearly everyone who has gone to university has at some point photocopied something from a book in the

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library for use as an adjunct to one of their courses. This is legal: it's "private study." And no doubt everyone has stood waiting patiently while some turkey further up the line photocopies an entire book. What they did was legal . . . again, it's "private study." But if a professor had photocopied a book from the library and then handed out copies of the photocopied book to his or her class, that would not be legal as it was no longer "private study." What then of the professor who photocopies an article and hands out copies of the magazine article to a class? It's legal, because it's student "research."

Firm Ground

Next come the software programs contained in ROMs. How do they fit in? Until recently, the question was unclear . . . now it's just hazy . . . as there had been essentially no significant court cases and lawyers were unsure as to how far this "human readable" business extended within the meaning of the act and whether the current act provided protection or not. The difficulty surrounded the question as to whether "patterns" . . . the shapes of the circuitry, miniaturized and included in the ROM and wired into the computer . . . constituted a "work of art" and hence were copyrightable or not.

Finally, what of making a copy of a program on a floppy and using it as backup? This has never been tested in court and as such there are no precedents. In all probability it's legal, since you would only use it if the first floppy was lost or destroyed in some fashion. Fortunately, a number of companies which sell floppies, particularly those containing business programs, suggest that you make a copy "Just in case." At least so far, it is best for it to be left under the general heading of "what mother doesn't know, mother can't spank your bottom for."

In Canada, there have been a number of cases in which video games have been alleged to infringe on the protection afforded by the act. The legal arguments have revolved around the optical image presented on the video screen by the copyright holder and the alleged infringer. If the images were close enough, the courts have always ruled that the infringer was in violation of the act and damages of some sort have been assessed.

The second pertinent case involved *Spacefile Limited* versus *Smart Computing Systems*. There the question was whether a former employee had copied and taken "confidential" programs and passed them on to the defendent, who subsequently used them for sale. The court ruled that there was "an almost identical copy of the plaintiff's system" in the defendent's system, and as such Justice Steele applied an enjoinment against the defendent, prohibiting them from continuing to copy and sell the program until trial. There has as yet been no trial, the plaintiff has secured what they wanted and to leave appeal requested by the defendents was denied last November.

The protection of software by the act was first determined in Canada in 1982 by the Federal Court of Appeal in the case of *Nintendo of America Inc.* versus *Coinex Video Games Inc.* It was this decision which led the Ontario judge, Justice Hughes, in early December to grant an interlocutory injunction against Computermat Inc. and Computermat's General Manager, Mr. Michael Standford.

The case arose when Apple Computer Incorporated sued Software One Limited, Computermat and Stanford, alleging that the Golden II computer distributed by Computermat breached the act in that the Golden II's motherboard, disk controller card and firmware ROMs duplicated those found in Apple II circuits and Apple's "Autostart" and "Applesoft" routines. Software One did not contest the action and so an injunction was automatically laid against them. No damages were assessed. Exit stage right Software One, at least as far as this play is concerned.

Computermat and Stanford contested the action. Scheduled for an early November hearing, the decision was not handed down until early December. In it, Apple presented five affadavits to demonstrate the relationship between their and the Golden II's system and how the relationship was so close as to constitute infringement of their rights under the act. While the defendents reportedly "hotly contested" the request by Apple for an interlocutory injunction against them, the court upheld Apple's request. In his decision, Justice Hughes referred to the Federal Court of Appeal's decision in determining that breach of copyright had occurred in regard to the software involved, but pointed out that software on a chip and the copyright protection afforded, if any, had never been determined at trial. As such he handed down an interlocutory injunction against the defendents and required that a one hundred thousand dollar bond be posted by them as security, pending the outcome of the trial. In other words, they can continue to distribute the Golden II, but should they lose at trial then, if damages are assessed against them, that the bond may be applied toward the damages.

The net effect of these decisions is that copyright protection of programs on floppy disks has been upheld, while copyright of software on chips has yet to be determined at trial, but has resulted in the awarding of an interlocutory injunction against the sale of such material by an alleged copyright infringer.

Court And Spark

What does the future hold? There are a number of things. Look for a couple of trials for a start, followed by changes in the act. Then, of course, there will be the counter assault by the high-tech forces employed by the Society for the Suppression of Piracy.

First let's look at the changes in the act. Currently rattling around in the Department of Consumer and Corporate Affairs is a proposal to amend the act in a number of ways to bring it up to date as it were. As far as computers are concerned, there are three possible developments. The first is the requirement that software in ROMs be suitably marked with the copyright symbol as per the Universal Copyright Convention. The minor difficulty with this is that under this Convention a "literary work" only commences to receive protection when it is "published." The question arises as to what constitutes "publication" of computer software. It is customarily agreed that a specific definition to cover the legal meaning of this word will have to be enacted, either as part of the Copyright act revisions or as a separate piece of legislation.

The second contemplated change covers the period of protection. Firstly, copyright protection is for the life of the author plus fifty years. Secondly, it is the opinion of the Department that this length of time is far in excess of any useful period for software protection. Thirdly, the Department believes that the Berne Convention does not cover computer software. Essentially, then, the Department would be attempting to decrease the time period of protection to say, ten or twenty years without contravening the Berne Convention.

Another element to be addressed is the protection under the revised act afforded to programs written *before* the act was revised. Would they be protected for fifty years after the death of the author or, would they only be protected for the ten to twenty years specified under the revised act? The answers are uncertain.

Thirdly, the Department is attempting to address the questions that arise under Article 17(2)(a) detailed above and the problems that it raises *vis-a-vis* "archival" or backup copies.

While it may appear superficially easy to enact these changes, there are ramifications on, among other areas, such as broadcasting in general, video tapes of rock

Exceltronix

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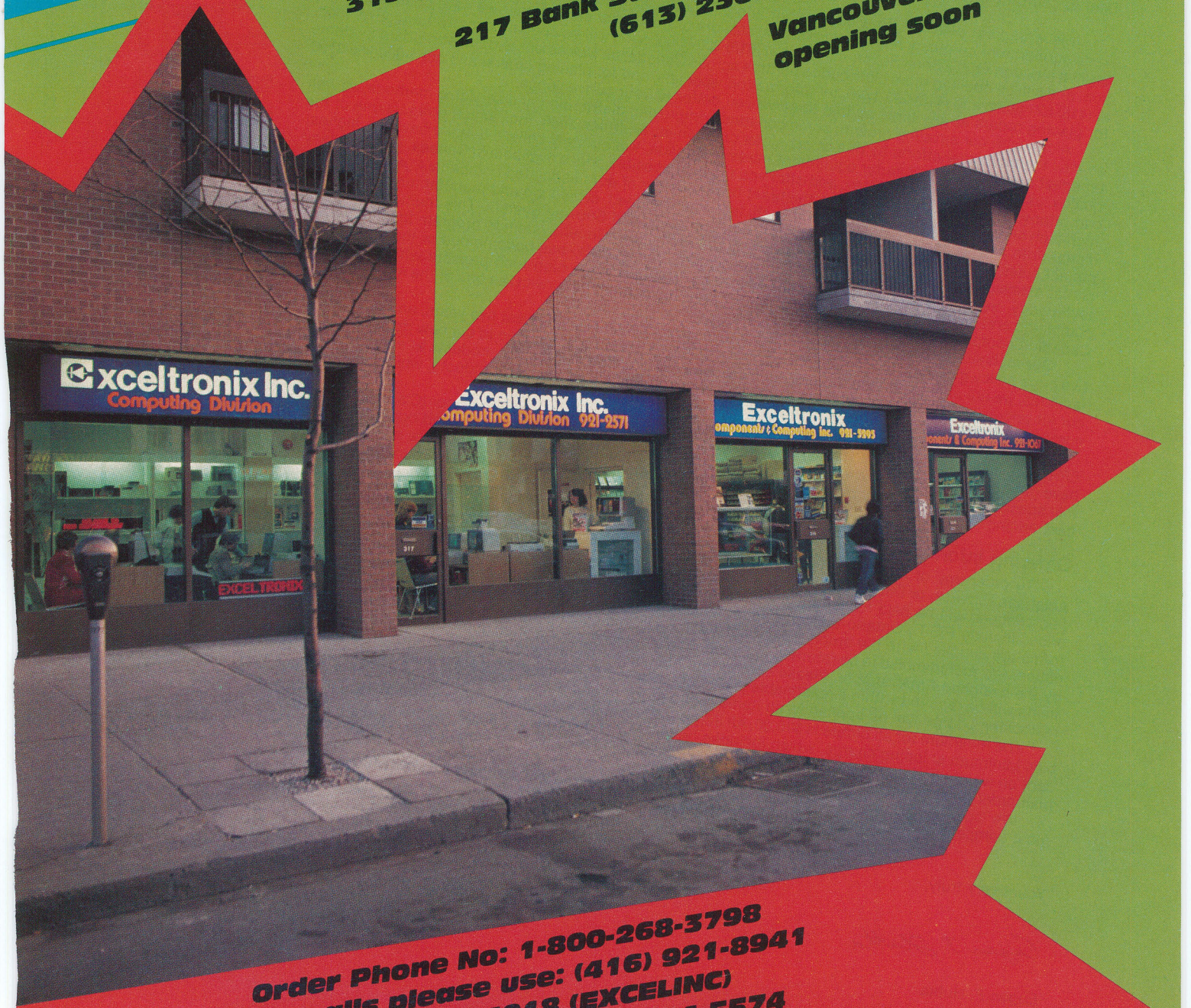

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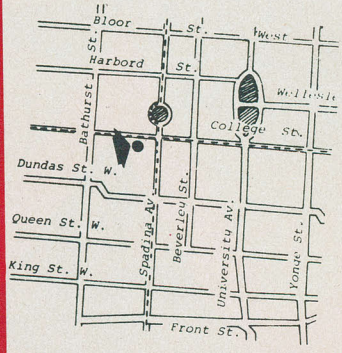

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May, 1984

Dear Exceltronix Customer,

It is with great pleasure, that due to your annual continued multi-million dollar mail order and walk-in trade support, our company has **quadrupled** the size of our **mail order service,** that we have opened the new **Ottawa location** at 217 Bank St., phone number **(613) 230-9000,** soon will be opening our new Vancouver location, and will be opening more distribution centres across Canada, as well as our two Bulletin Board Systems at **(416) 624-5574,** and **(416) 293-1796,** for information, specials, and for placing orders, and our **1-800-268-3798** for placing orders at any time; all this to serve you better at your convenience.

Along with our amazing growth, come constantly improving distribution and servicing methods, as well as new technological efforts by one of our sister companies, **Multiflex Tech. Inc.,** which gives us one of the broadest selections of computer equipment made in Canada. We strongly believe that we have the highest quality, use the newest technology, and offer you the best possible prices available in Canada. Our company can offer you the lowest prices due to the great buying power of our associated companies. Another of our high-tech sister companies, **Versa-Digital Tech. Inc.,** has designed, developed and manufactured a complex digital time and message display network in the Toronto Transit Subway System. This multi-million dollar project, uses an upgraded and redesigned version of the Multiflex Super System to program the hundreds of digital message centres throughout the subway system. Versa-Digital has become one of the hot spots of technology, as per the Canadian Business Magazine. The numerous high tech projects which have been completed and are being developed at the present time, have thrust us forward as one of the most advanced Canadian computer companies.

Our technical know-how, coupled with our sales and service over the past five years, and our competitive price policy gives you good reason to shop Canadian at Exceltronix Inc. Due to our new mass production facilities, we are able to provide professionally assembled and tested computer products at similar prices to our kit prices. We are able to offer a warranty with our assembled and tested products, which ensures the customer of reliability.

Of course we still have a large selection of TTL, CMOS, linear and microprocessor IC's, memories and EPROMS, as well as all the discrete components and test equipment. Our software and book departments have greater selection than ever before. Prices, of course, are constantly changing; please refer to our monthly specials in ETI, Computing Now!, Computers in Small Business, and Computers in Education, or call for best pricing.

Ordering Information

To order any of our products, please send payment by cheque or money order, VISA, Master Card, American Express, or Diners Club. If you are in a real hurry please use a bank transfer or wire. All non-certified cheques will be held for ten business days for clearance before any items can be shipped. All of the prices include F.S.T.; Ontario residents must include 7% P.S.T. with their order, unless proper exemption forms are supplied with the order. Please note, all prices and specifications are subject to change without notice. Any merchandise to be returned to Exceltronix must have prior written approval, and be accompanied by the assigned RMA number. Please contact our mail order department for more information. Warrantied items will be repaired within a reasonable period of time. Refunds will not be issued in lieu of repairs. A 15% restocking charge will be applied to all items returned for refund unless prior written approval is obtained.

The minimum for all orders is $10.00. All items will be shipped via UPS or other suitable courier (if possible). Minimum shipping charge, which includes handling and insurance is $5.00. Shipping rates are dependant on weight and destination, as well as choice of courier company. If you are unsure, please contact our mail order department for your individual requirements.

We look forward to your continued support and hope that you will continue to grow with us, in this the most competitive field, computers and components.

Yours very truly,

Eugen F. Hutka

Eugen F. Hutka
President
Exceltronix Components and Computing Inc.

Prices and specifications subject to change without notice

HIGHLIGHTS

Cover Page

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Page 2

Progress Letter and Ordering Information

Page 3

This page gives you a fast product and price overview
Remember, "You can't beat the BEST!".

Page 4

Apple II + ... $ 995
Apple II Package Deal $1495
Apple IIe $1389
Apple IIe Package $1950
Apple Macintosh $3195
Multiflex 3 ½" Drives
for the MacIntosh ..... $Call
Excel 2 6502 Computer ..... $ 669
Excel 2 Package ..... $ 959
Excel 6 6502 System $1059
Excel 6 Ultra Loaded $1889

Page 5

Apple Compatible Peripherals
Probably the best prices anywhere!
16K RAM Card ..... $ 59
128K RAM Card $239
Z80 Card ..... $ 59
80x24 Video Card ..... $ 85
Disk Controller Card ..... $ 69
Parallel/Printer Card ..... $ 69
Z80/64K Card ..... $Call
Serial/RS232 Card ..... $ 99
8" Floppy Controller Card ..... $Call
EPROM Programmer Card ..... $ 69
Apple Compatible Disk Drive $248
10Meg Hard Disk for Apple ..... $Call

Page 6

Multiflex Terminal $319
6809 U of T Board $389

Page 7

Multiflex "Smart" Z80A System $1499
Single Board Computer ..... $ 399

Page 8

The "BEST" IBM Compatible $1995
The Loaded "BEST" $2595
The "BEST" with 10 Meg Hard Disk $3995

Page 9

IBM Compatible Peripheral Boards
Colour Graphics Video Board $339
Expansion Card ..... from $199
Floppy Controller board $299
8088 Motherboard ..... $Call

Page 10

More IBM Peripherals
Parallel/Games Port $149
EPROM Programmer ..... from $149
10 Meg Hard Disk & Controller $1660
1200/300 Baud Autodial Modem
(Soon to be announced) ..... UNDER $350
Books and Software for the IBM and Apple (only a fraction of our inventory) Call for any of your software requirements

Page 11

Printers
Gemini 10X $359
Gemini 15 ..... $599
Delta 10 ..... $798
MX100 ..... $995
TTX Daisy Wheel $599

NEW

Smith Corona Ultrasonic $839
Paper and Ribbons
Monitors
ZVM 123 Green $129
ZVM 122 Amber $139
Amdek Green $135
Amdek Amber $139
Colour Monitors at excellent prices
5" Green Screen Monitors ..... $ 59
Modems starting at ..... $ 49
Disk Drives
IBM Compatible SA455 (DSDD) $299
SA390 ..... $199
Diskettes — Huge selection at Ultra Competitive Pricing
Joysticks ..... from $19.95
Koala Pads $139
RF Modulators $18.95

Page 12

Hobbyists Delight
IBM Compatible Case ..... $ 89
IBM Compatible Keyboard $189
Superb 6502 ABS Case & Keyboard $189
For Power supplies see page 15
Hard-to-get parts for your IBM and Apple Compatible Boards. We carry them at super prices.

Page 13

You're in Luck on this Page!
Microprocessor Chips. Huge Selection
Examples:
6502 ..... $ 7.50
Z80A CPU ..... $ 6.85
8088 ..... $29.95
CMOS Chips and Linear Chips. Good stock and excellent price.

Page 14

TTL/74LSxx. Having a hard time finding these? Call Exceltronix for great pricing and delivery from our stock of 100,000's of pieces.

Memories. don't forget us!
Examples:
4116 ..... from $ 1.70
4164 ..... from $ 8.95
2114 ..... $ 2.99
2716 ..... $ 6.50
2732 ..... $ 8.95
2764 ..... $13.95
27128 ..... $59.00

Page 15

Schottky TTL (74Sxx) Series
Voltage Regulators
Power Supplies ideal for your 8088/IBM and 6502 Compatible systems.
Superb Power Supply ..... from $69

Page 16

Multiflex Z80A S100 Starter Computer
System with built-in EPROM Programmer $299
(Time limited offer. Don't miss it)
Multiflex S100 CPU Board $249
Multiflex S100 Video Board $269
Multiflex S100 Floppy Disk Controller $269
Multiflex 256K RAM Card ..... from $249
Multiflex S100 Static RAM Card ..... from $ 99
(The prices on page 16 are for built and tested units — NOT kits!)

Page 17

We had to fit it all into 16 pages but we have vastly more than is in this catalogue. For example Resistors, Transistors, Capacitors, SCRs, TRIACS, Crystals and a vast selection of sockets. Prices on the items just mentioned are mostly the same as our November 1983 Catalogue.

Exceltronix

Microcomputers

Apple II + $995.00

Standard Apple II + includes an attractively packaged system, with upper and lower case keyboard, 48K of RAM, and 8 expansion slots.

Apple II + Package deal for $1,495.00 includes:

- Apple II +
- Multiflex Disk Drive & Controller
- Multiflex 16K Ram Card
- Multiflex Z80 Card (CP/M software not included)
- Multiflex 80 x 24 video card (with soft switch)

Apple IIe Computer $1,389.00

Features:
- upgraded version of Apple II

Standard Packages includes:
- 64K of RAM
- full upper and lower case keyboard
- high resolution graphics
- wide software and hardware support
- built in self tests
- compatible to Apple II +, PLUS many more improvements.

Apple IIe Package Deal $1,950.00

- Apple IIe
- Multiflex Disk Drive & Controller
- 80 Column Card
- Multiflex Z80 Card (CP/M software not included)

Apple MacIntosh Computer $3,195.00

Features:
- ROM. 64K, RAM 128K.
- Microprocessor. The 32 bit Motorola MC68000 microprocessor.
- Disk Drive. Built-in 3½" disk drive, which can store 400 K per disk.
- Mouse. Features: one button, a rotating ball and optical sensors to translate movements of the mouse to MacIntosh's screen pointer with pinpoint accuracy.
- Display. Nine inch, high-resolution (512 x 342-pixel) bit mapped display. Green Screen.
- Polyphonic Sound Port
- Optional 3" drives will be available in June from Multiflex Tech. Inc. at unbeatable low prices.

Exceltronix Super 6502 System: EXCEL 2 . . . $669.00

We strongly believe that our 6502 system will efficiently serve all of your needs; all of the options are on one board. Excel far surpasses many of the other 6502 systems.

Features:
- attractive case
- heavy duty power supply
- superior high quality professional keyboard with upper and lower case, and numeric key pad
- 80 x 24 video, with soft switch on board
- 64K of RAM on board
- 2 Drive Floppy controller on board
- Five additional expansion slots
- Fully assembled and tested, 90 day limited warranty
- (System comes with 2 blank eproms on board; does not include boot software)
- Systems are professionally assembled and tested (boards are wave/flow soldered and ultrasonically cleaned.).

EXCEL 2 Package . . . . $959.00: Includes:

- 6502 system as described above
- Multiflex Apple TM Compatible Disk Drive
- Z80 Board (CP/M software not included)

Apple and Applesoft are trade marks of Apple Computer Canada

EXCEL 6 Package . . $1,059.00

Features include:
- our super 6502 system (same board, with same features, as used and described in the EXCEL package, BUT:
- comes with new attractive case (as seen in picture)
- IBM compatible extra high quality serial keyboard
- Multiflex serial to parallel programmable ASCII converter card
- Extra heavy duty power supply, with RFI filter and power light indicator built into the power switch.
- Special silent 3" Fan is built in, to keep your system cool.
- one Apple compatible built-in disk drive, which leaves enough space for an optional hard disk drive or another floppy drive.
- (Blank Eproms included, but does not include the Boot software or Basic)

Same EXCEL 6 package as described above, with 2 Apple compatible floppy disk drives $1,289.00

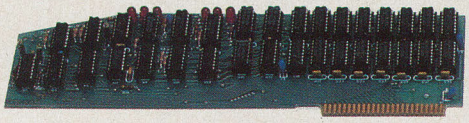
EXCEL 6, Ultra Loaded Package $1,889.00

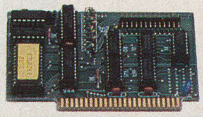
- EXCEL 6 system
- 2 built-in drives (Apple compatible)
- complete Z80 Card (CP/M software not included)
- Multiflex Parallel Printer Card and Cable
- Star Gemini 10X Printer
- Zenith or Amdek 12" green screen or amber monitor, with video cable

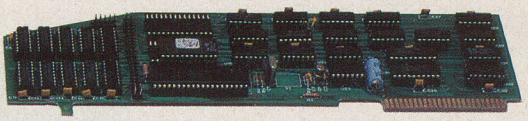
With the purchase of any of these systems you are entitled to a 5% Discount on all our Apple software, books 128 k RAM and our Z80/64K Card. Offer valid until June 30th, 1984.

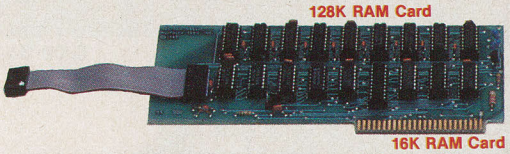
Apple Compatible Peripherals

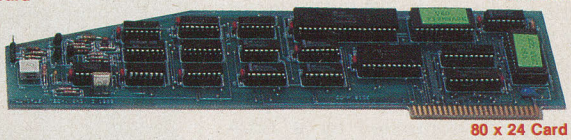
All of our peripheral boards are professionally built, cleaned and tested, with a 90 Day Limited Warranty.

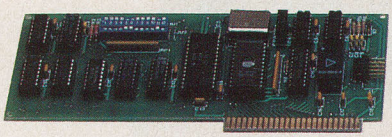

128K RAM Card

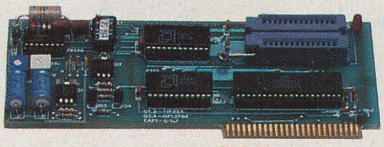

Parallel Printer Card

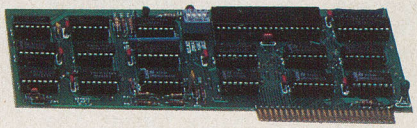

Z80/64K Card

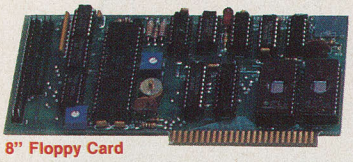

16K RAM Card

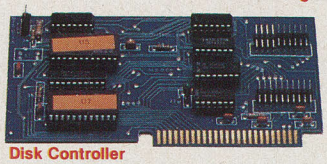

80 x 24 Card


Serial Card


EPROM Programmer


Z80 Card


8" Floppy Card


Disk Controller

MULTIFLEX Z80-64K CARD $Call

This spectacular card provides you with the functions of a Z80 card along with giving you extra 64K of self contained memory, on top of the existing memory in your Apple computer. (Software not included)

MULTIFLEX 16K RAM CARD $59.00

Expand your 48K Apple II+ to 64K. The Multiflex 16K Ram Card allows other languages to be loaded into your Apple from disk or tape.

WIZARD 16K RAM CARD $89.00

Same functions as Multiflex 16K Ram Card

MULTIFLEX 128K MEMORY CARD . . $239.00

(with 128K of RAM on board)
(with 64K of RAM on board) $169.00
(software not included)

128K Card can be used to function as RAM disk with your Apple.

MULTIFLEX UPGRADED Z80 CARD $59.00

This card allows the user to run Z80/8080 programs on his Apple II+ or IIe computer. Specifically, it allows him to run the CP/M operating system with all its attendant software such as word processors, accounting packages, etc. (CP/M software not included).

MULTIFLEX NEW SUPER 80 X 24 VIDEO CARD $85.00

This new Multiflex card features: • superb 80 columns by 24 lines display, with upper and lower case, reverse video • includes built-in soft switch, allowing you to switch between the Apple's 40 column and the video cards 80 column from the keyboard. • superb compatibility.

MULTIFLEX PARALLEL PRINTER INTERFACE CARD WITH CABLE $69.00

This card plugs into any of the Apple II+, IIe, or workalike computers, and provides the user with a parallel interface capable of handling graphics and characters. Ideal for use with the Star Gemini and Epson Printers.

WIZARD IPI INTERFACE $85.00

MICROTEK APPLE DUMPLING PARALLEL CARD $169.00

Similar functions as Multiflex Parallel Printer Interface Card with Cable.

WIZARD BUFFERED PARALLEL INTERFACE CARD

BPO 16 . . . . . $189.00
BPO 32 . . . . . $239.00

MULTIFLEX SUPER SERIAL CARD $99.00

This card allows you to: • select desired baud rate • connect to a serial RS-232 modem, terminal, or a serial printer port • for example, connect two Apple computers (using this card) to communicate with each other, through the RS-232 link over hundreds of feet.

MICROTEK SERIAL CARD FOR THE APPLE $139.00

Similar functions to MULTIFLEX super serial card.

MULTIFLEX FLOPPY CONTROLLER $69.00

Features:
- plugs right into slot #6 in your Apple computer
- capable of handling up to two Apple compatible drives.

RANA FLOPPY . . $149.00 CONTROLLER CARDS

Features:

- plugs right into the Apple computer
- handles up to four Apple compatible drives

MULTIFLEX FLOPPY CONTROLLER FOR 8" DRIVES . . . . . $Call

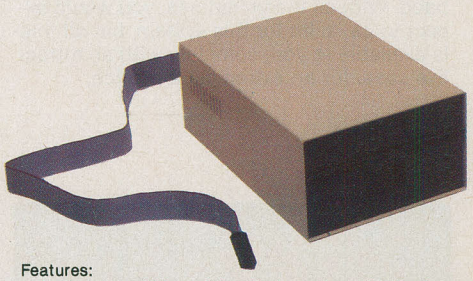
This card plugs into the Apple computer and allow you to use 8" DS DD Disk Drives. (Software not included).

MULTIFLEX EPROM PROGRAMMER $69.00

Features:
• Eprom programmer for Apple computers • Programs 2716, 2732, 2732A, 2764 • ZIF socket for the EPROM • Complete with software • Comes with a built-in programming voltage supply.
Included with the card is a disk full of software, which using menus allows the user to program or verify EPROMS, check if they are blank, set pointers anywhere in memory, and save or load memory ranges to/from the disk drive, making this unit a very versatile piece of hardware for the hardware developer or hobbyist.

APPLE COMPATIBLE DISK DRIVES

FAMOUS MULTIFLEX DISK DRIVE 248.00



Features:
• Apple compatible • Attractively packaged • Professionally built and tested • Canadian Made • 1 year warranty • We believe that Multiflex put out more drives in the last year than all other Canadian manufacturers combined.

PACKAGE DEAL #1 includes:

MULTIFLEX DISK DRIVE (as described) and MULTIFLEX FLOPPY DISK CONTROLLER $309.00

PACKAGE DEAL #2 includes:

TWO MULTIFLEX DISK DRIVES AND MULTIFLEX FLOPPY DISK CONTROLLER $555.00

Also available: If you have more money to spend :

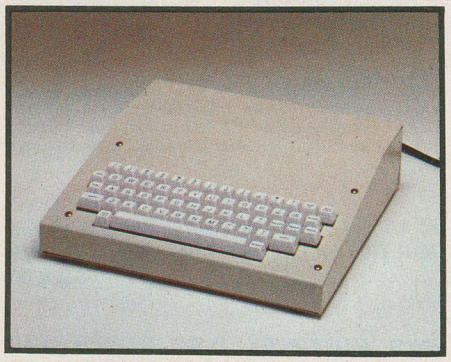
Quentin Drives	$299.00
Microsci A82 80 Track	$539.00
Microsi A2	$310.00
RANA Elite I	$342.00
RANA Elite III	$989.00
RANA Controller (90 Day Warranty)	$149.00

Excelltronix

Multiflex Products

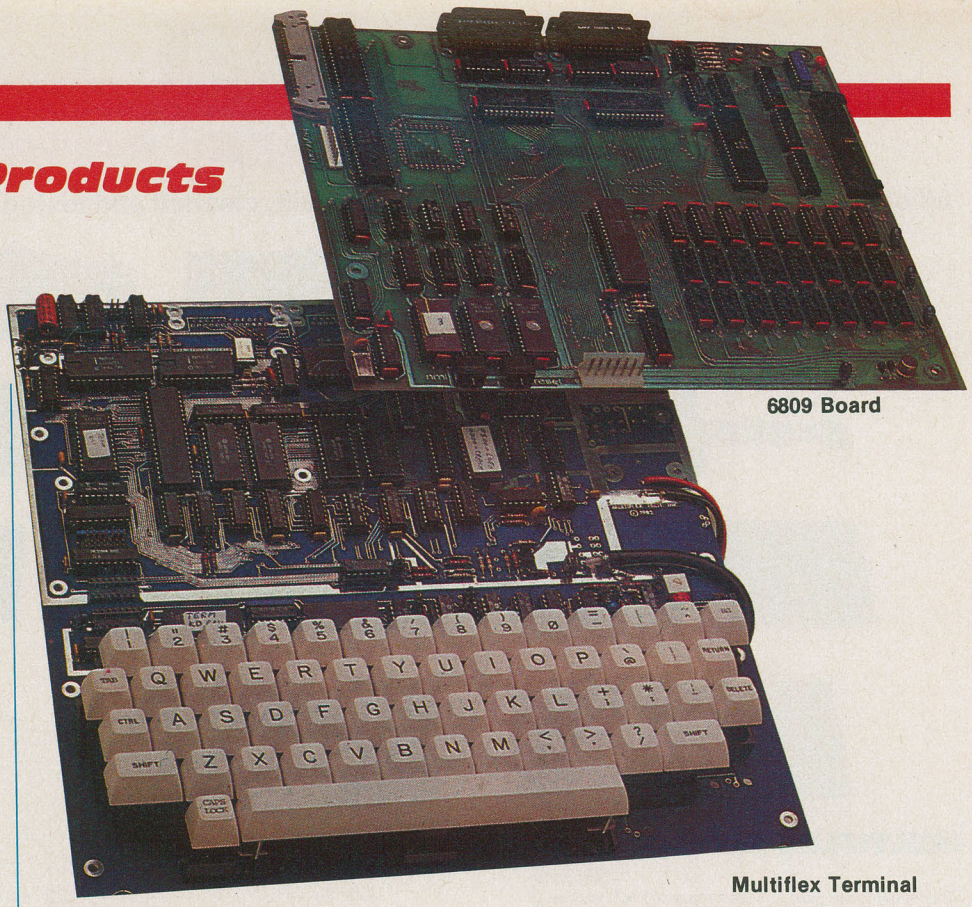
Multiflex Economy Video Display Terminal

Now available from MULTIFLEX is an economy video display terminal. Originally designed as a low cost access unit for our mail-ordering and bulletin board system, this terminal is a semi-intelligent system which is controlled by a Z80A microprocessor and a 6845 CRT controller chip. The keyboard is fully ASCII encoded and the character generator contains the full 128-character set as well as a 128-character alternate set both of which are in the 5x7 dot matrix format. The screen display is 80 characters by 24 lines if the unit is hooked to an external monitor. (Monitor not included). There are 3 software selectable attributes (dim, reverse video, and alternate character set) which can be chosen one at a time for the whole screen. The attribute can then be switched on and off for each individual character. A 2K buffer is provided for normal operation. However when the optional 6K memory upgrade is purchased, 4 screen pages can be loaded from the host machine, edited, locally, and then downloaded back to the host again saving on connect time and phone line bills. Also included are 2 RS232 ports: one for a modem and one so that a printer can be attached to the terminal. The baud rates on these ports are software programmable and can range from 110 to 9600 baud. With all these features, you would expect to pay a lot for this system, but all this is available to you, complete with an attractive case, for an extremely low price.



Terminal Complete: Tested and 90 days warranty with 2 RS232 ports, 2K buffer case and power supply (Hydro approved)

$319.00



6809 Board

Multiflex Terminal

U of T 6809 Single Board Computer

The 6809 Single Board Computer, designed at the University of Toronto and distributed exclusively by EXCELTRONIX, is a compact hardware unit which was designed originally as a lab board for teaching students about microprocessor systems. Its many features, however, make it an ideal unit for stand-alone control applications or software development systems as well.

The system is designed around the Motorola MC6809 microprocessor. This is an 8-bit processor with full 16-bit internal architecture, 2 index registers, 2 stack pointers, 2 8-bit or 1 16-bit accumulators, a direct page register and a wide range of addressing modes, including a program-counter-relative mode. This mode allows the user to write completely position independent software, important in systems software development.

There is provision for up to 48K bytes of dynamic RAM on-board. The refreshing of this RAM is controlled by an 8202 Dynamic RAM Controller. This chip allows for completely transparant refreshing of the RAM (ie. no wait states to slow the system down). There is also provision for up to 12K of EPROM using 2532 chips.

There are 4 complete I/O circuits built onto the board. 2 of them are serial (RS232); one is used for a terminal (which is required for use of the board with the supplied monitor software), and the other one is user defineable, but it is set up to communicate with either a modem or a printer. Also on-board are 2 6522 VIA chips. These provide 2 parallel ports per chip along with 2 16-bit timer/counters. One of the parallel ports and one of the timers are use by the monitor software to provide a cassette interface (which operates at 300 baud). The second parallel port on that chip is wired into a connector which is ideal for interfacing a parallel printer or keyboard. The 2nd VIA is not used at all and is completely free for the user. For further expansion of the system, a fully buffered version of the CPU signals (data, address, control lines and a signal indicating whether or not the current address is located on the board) is available at a cable connector.

The software provided with the system is in a 2532 EPROM and allows the user to: test the memory; dump blocks of memory; examine and modify single memory locations; read or write from the cassette port; set and examine breakpoints; single step and/or execute machine language programs and set and examine the processor registers. All this is accomplished through a 9600-baud terminal interface (one of the serial ports) Included is a full screen editor/assembler which allows the user to work in 6809 assembly language rather than machine language. All this makes this board an ideal trainer, control unit or software development unit for just about anyone.

Includes U of T course documentation

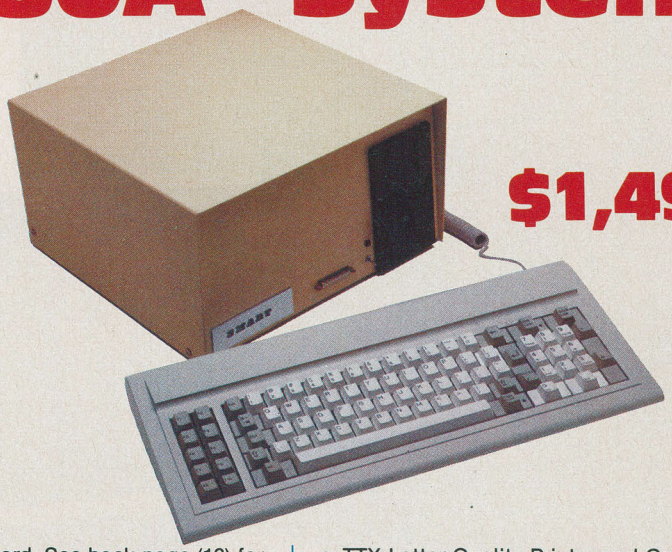
A&T with 48K

$389

Special Pricing is available when both items on this page are purchased together

Multiflex Z80A "System

Do you need a good, fast and reliable S-100 Z80A CP/M system?
One you can afford?. . Here it is. . $1,499.00, (Offer valid till June 1, 1984)



$1,499

The Loaded "SMART" Package

Features:

- Z80A CPU with 64K Memory
- one RS-232 Serial Port (second RS-232 port optional)
- parallel printer port
- 6 slot S-100 Back Plane
- Floppy controller board capable of handling up to four DS DD, 5¼" or four 8" disk drives.
- video board 80 x 24 with buffer memory and keyboard interface
- IBM compatible professional (serial output) keyboard
- two SA 455 disk drives
- powerful power supply, with silent fan and power to spare for more 5¼" drives, if needed.

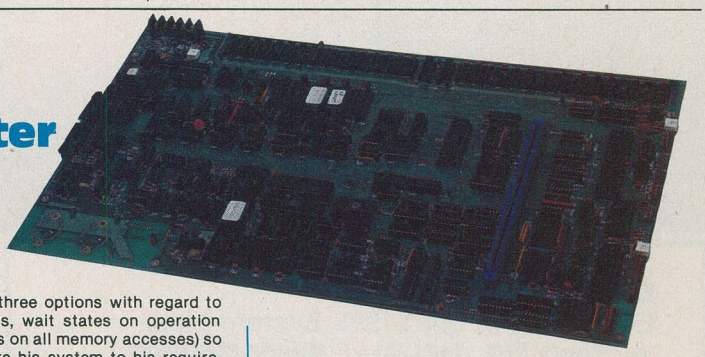
Optional:
256K memory board. See back page (16) for description and price.

- CP/M 2.2. . . . . $159.00
- 12" Green or Amber Monitor. . . . . $139.00 (with cable, ready to plug into our video board)
- Gemini 10X Printer and cable, ready to plug in. $379.00
- TTX Letter Quality Printer and Cable. $629.00

For under $2,000.00, you can have all the computer equipment you have always wanted, but couldn't afford. Special variations of this package are available, please call.

Hobbyists Delight

Multiflex Single Board Computer starts at $399



For $399.00 you obtain the following minimum essentials, which allow you to start using the board.

- Z80A CPU section with 64K RAM
- Floppy Controller section
- Minimum requirements for the on-board video section, 1 parallel port

If you have the basic board, all you need extra are:

- Keyboard, starting from. . . . . $49.00 to $200.00
- Monitor, start from . . . . . $59.00 to $200.00
- Power Supply $139.00
- CP/M $159.00

Optional Features. Call for pricing

* Full IEEE S-100 bus for easy expansion.
* Up to 256K of on-board dynamic RAM.
* Processor speed 4 MHz.
* Memory management for up to 16M bytes of memory.
* 3 16 bit timer/counters.
* 2 RS232C serial ports.
* 24 line parallel port.
* Real time (time-of-day) clock.
* Floppy disk controller.
* 80x24 video display.
* 512x512 bit-map graphics
* Print spooler.
* Optional RF modulator.
* Priority interrupts.
* Fully CP/M compatible.
* Many jumper-selectable hardware options.

The MULTIFLEX Single Board Computer is among the new breed of state-of-the-art Canadian computer products. with a Z80 series microprocessor, 64K of dynamic RAM, a full featured floppy disk controller and a 80x24 video section, all on the board, this unit makes an ideal low-cost system for the CP/M operating system.

The memory section has a number of unique features rarely to be found on any other machine. The circuitry is provided on-board for up to 256K of dynamic RAM (using 4164 64K x 1 chips). Jumper options allow the user to select one of three options with regard to wait states (no wait states, wait states on operation code fetches, or wait states on all memory accesses) so that the user can configure his system to his requirements. Four jumper-configurable sockets are furnished as well. Any mix of 6116/2016 (2K x 8 RAM); 2716 (2K x8 EPROM); 2732 (4K x 8 EPROM) or 2764 (8K x 8 EPROM) can be placed in this socket, which can be enabled to shadow any other memory which would be addressed in these locations. It is also possible to disable these sockets in software, if the user wishes to do so. Full memory management is available on the board which can turn the Z80's standard 64K address space into the full 16 Mbyte 24-bit address space allowed by the S-100 bus standard. This memory management applies to the 256K RAM on-board, all other on-board, all other on-board memory, and all memory on the S-100 bus.

The board also contains a full-featured floppy disk controller. Based on the WD1793 IC, this section will handle any combination of 8" or 5¼" drives, whether they be single or double sided. The newest technology was also used in designing the data separator circuit. This circuit is all-digital, allowing extremely reliable use in the double density mode. The floppy controller is fully compatible with both CP/M, giving the user full flexibility as to what operating system he wants to run.

For interfacing to the real world, the user is again given the flexibility to configure the system to his own needs. Supplied are 3 independant software and/or hardware controlled 16-bit timer counters, 2 of which are used to generate the baud rates for the 2 on-board RS232C serial ports. Both of these ports are programmable for either synchronous or asynchronous operation. A full 24-line software controlled parallel port and a real time (time-of-day) clock, which can be backed up with batteries if the user so wishes.

The real-time clock, the floppy controller, the timers, and any other I/O port can be chosen to operate in a software selectable priority interrupt scheme. A second interrupt controller allows the on-board interrupts to be vectored with and other interrupts from external S-100 bus boards in a jumper selectable priority.

There is a full video section on the MULTIFLEX Single Board Computer as well. A second Z80 processor is used along with a 6845 CRT controller, giving the user a variety of features. Up to 8K of EPROM can be used to control the section, allowing emulation of a variety of terminals or room for custom display routines. 8K of statis RAM is also provided for, this being used for the display buffer, the Z80's work area, and a print buffer. The print buffer can be used for the built-in Centronics-type printer port in the section. An ASCII keyboard port is also provided. The character generator on the board provides up to 256 characters and symbols, which are user-programmable since they are in a 2732 EPROM. The video output is available in two forms: a composite video signal, and the separate sync and video signals, allowing the board to be used with a variety of monitors. As well, circuitry for an optional RF modulator is provided on-board, for easy connection to a TV set. The actual display format in text is 80 characters by 24 lines. But, a 192 by 256 pixel graphics mode is also made available to the user. The resolution of this graphics mode can be changed by the user by providing additional software. A full, general, graphics interface (for joysticks, digitizing tablets, touch panels, etc.) and a light pen input are provided so that user — friendly software is easy to implement on the system.

Overall, the MULTIFLEX Single Board Computer, with its numerous features can be many things to many users, from a full-featured Z80 development system to a very powerful CP/M based computer.

The "BEST"

IBM Compatible Microcomputer

See the Review in March 1984 Computing Now!

$1995

Not a kit — a complete system

This prices includes:

- **64K of RAM with pre-socketed provision for 256K**
- **One disk drive. SA455. Double Sided. Double Density**
- **Colour Video Board**
- **Floppy controller capable of handling up to four DS. DD 5¼" disk drives and socketed for optional serial port and real time clock**
- **Monitor not included**

Warranty: Full 120 day Warranty

IBM is a registered trade mark of IBM Canada Ltd.

Prices do NOT include IBM (Microsoft) BASIC or any proprietary software.

OR The Loaded "BEST"
Everything in our $1995 System plus:

- **Two DS. DD 5¼" Disk Drives**
- **On-board 256K of RAM**
- **RS232 Port**

$2595

OR 10 Meg Hard Disk Version
Everything in our $1995 system plus:

- **10 Meg Hard Disk Drive & Controller**
- **On-board 256K of RAM**
- **RS232 Port**

$3995

The BEST is an IBM compatible Microcomputer Standard features include the following: 8088 processor running at 4.77 MHz for fast service. (Room for the optional new co-processors, the most popular being the 8087 "number crunching" processor)

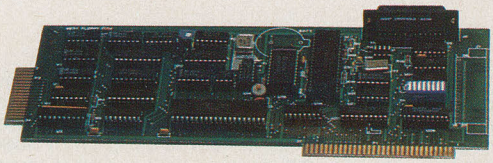
- 64K RAM expandable up to 256K in blocks of 64K and with the new high density RAMs, there is enough room onboard to hold 1 Megabyte of data in blocks of 256K.
- 5 expansion slots each being identical, so the user can upgrade his machine with IBM compatible hardware.
- D.M.A. controller. Three of the DMA channels are available to the user.
- A timer/counter. This is used by the system for time of day clock; tone generation of the speaker; and a time base.
- An 8 level interrupt controller, 6 of which are bussed to the expansion slots for feature cards. The other two are used for the time of day clock, and the keyboard circuits. (There is also a NMI which is not user accessable since it is used for parity checks.
- Three ROM sockets are available to the user, one generally holds the system BIOS, and the other two can hold any firmware the user wishes to implement.
- A speaker with ½ W of driving power is available to user software which can also control the frequency of oscillation. In fact 3 methods exist to modulate the speakers output: 1) direct control or the output bit stream. 2) output from the programmable timer. 3) the timer clock can be modulated with a program controlled I/O register bit.
- A keyboard interface which is compatible with all IBM compatible keyboards through a 5 pin DIN connector.

OPTIONAL FEATURES FOR THE BEST

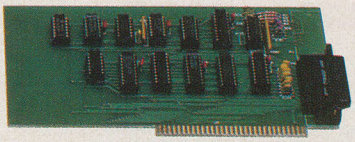
Because the standard BEST system comes with a 5¼" floppy DS, DD, disk drive it was felt that need for the cassette interface would dwindle, thus, to keep costs down the cassette has been designated as an option.

The cassette option requires that the user supply his own good quality cassette recorder and the system board communicates through either the microphone or auxiliary input. The data rate is between 1000 and 2000 bits per second depending on the bit stream sent to the recorder.

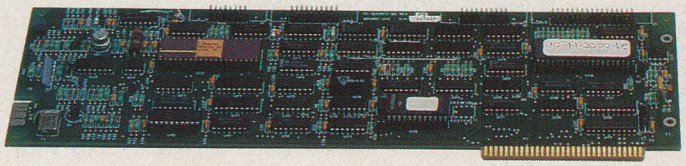
IBM Compatible Boards



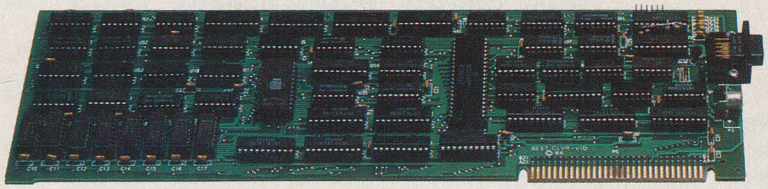
Floppy Disk Controller



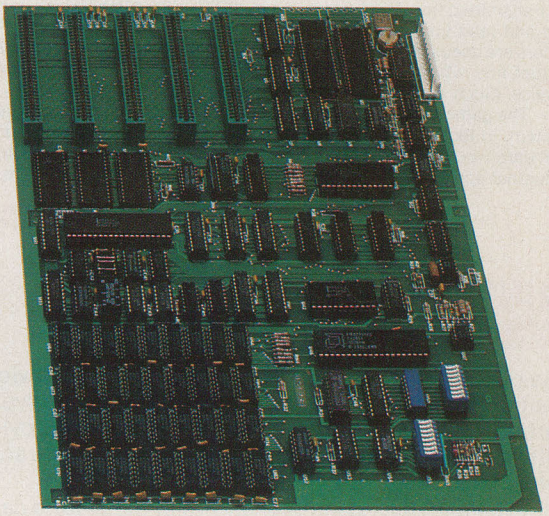
Parallel Card



Hard Disk Controller



Colour Video Card



8088 Board (call for pricing)

COLOUR GRAPHICS VIDEO BOARD $339.00

This board was designed to be compatible with a wide variety of display systems. Two types of output connectors are provided: 1) composite baseband video 2) direct RGB drive (9 pin D-shell Connector). In addition a light pen port is provided. It must be stressed that this card can be used in black and white with comparable resolution to that of the black and white board. Thus a low cost black and white monitor could be used in place of the more expensive colour monitor without loss of performance (of course colour cannot be achieved on a black and white monitor).

There are 4 modes of supported operation (more are available but the user must write his own software): low resolution graphics, high resolution graphics, low resolution alphanumerics, and high resolution alphanumerics. In the low resolution modes colour is available in a variety of foreground/ background/overscan colours. In high res. there is only black and white available, this is due to the video memory limitation.

GRAPHICS

LOW RESOLUTION:

In low res. graphics the screen is memory mapped into 320 PELS by 200 rows. Each PEL may have one of four colours. The background colour may be one of 16 possible colours the other three may be one of two selectable palettes, namely green/red/brown or cyan/magenta/white.

HIGH RESOLUTION:

In this mode all of the memory is mapped to the screen, thus only black and white is available. In high res. there are 640 PELS by 200 rows, twice that of low res.

ALPHANUMERICS

In both low and high res. alphanumeric mode the characters are generated via an eprom, thus special characters are easily implemented. In addition, it is possible for the user to specify the location of his own eprom external to the video board and be able to utilize both eproms for character generation.

LOW RESOLUTION:

Low res. is characterized by 40 columns by 25 rows of characters. Each character is composed of an 8x8 dot matrix. The characters are enclosed in a 7x7 matrix within this box, with 1 line for descenders. Sixteen foreground colours are supported and 8 background colours are available. In addition, blinking of individual characters is also available.

HIGH RESOLUTION:

High res. supports the standard 80x25 character matrix for high bandwidth monitors. Because all of the memory is used to display characters, colour is not available, however high res. supports the following on a per character basis: reverse video, blinking and highlighting.

IBM COMPATIBLE EXPANSION CARD

This card is really meant for IBM users who want IBM compatible products at sensible prices. (Note that the options presented here are already included in our BEST Computer.

This combination of options allows an IBM user to save I/O expansion bus room by providing a multitude of popular options on one board. (For a complete description of the options see other BEST products).

BASIC EXPANSION CARD $199.00

Includes 64K of RAM and completely socketed for the other options.

OPTIONS:

RAM. For each extra 64K RAM (to maximum of 256K total) **$85.00**

PARALLEL & GAME PORT $69.00

Will also drive parallel printer.

SERIAL PORT $69.00

REAL TIME CLOCK $59.00

CARD with all the above (256K RAM) **$599.00**

Printer cables and software not included.

FLOPPY CONTROLLER BOARD AND OPTIONS

This board actually contains three separate units, one being standard and the other two being options. The standard unit is the floppy controller card. The options being the asynchronous serial interface and the other being a real time clock with battery backup.

FLOPPY DISK CONTROLLER: . . . . . $299.

This controller can control four 5¼" floppy disks. Two disks are controlled by an internal daisychained ribbon cable, the other two are connected externally through the back pannel via a connector. The controller is based on the NEC Upd 765 or Intel 8272 chip and can control double density/double sided floppy disks, thus giving a formatted capacity of about 320K bytes per drive. The card uses the main boards interrupt and DMA capabilities to improve performance. The board also features write precompensation and digital phase lock loops for "solid" reliability.

ASYNCHRONOUS COMMUNICATIONS OPTION $69

Communication is achieved through one of two means: standard RS232 protocol or though a 20mA current loop.

The transmission speed is programmable from 50 to 9600 baud, with 5,6,7, or 8 bits per character and 1,1½, or 2 stop bits, any combination is supported. The system is based on the INS8250 chip which also provides the following features in addition to those above:

- full double buffering, eliminating expensive, precise synchronization.
- full modem control functions: CTS, RTS, DSR, DTR, and RI.
- false start bit detection.
- line break generation and detection.

This card interfaces easily to any one of the popular modems as well as being able to fully exploit the capabilities of the 'smart' modems.

REAL TIME CLOCK: $59

This option is based on the MM58167 CMOS chip, thus battery backup is easily implemented, this allows continous time keeping even when the machine is powered down.

FLOPPY BOARD including both options above $399

No cables or special software included.

continued on next page

This prices shown are introductary and are subject to change.

Exceltronix

IBM Compatible Boards

PARALLEL/GAMES PORT

This low cost board allows any IBM compatible printer to be connected to the system. The printer signals are through a DB25 connector and can be connected to many parallel Ideal Printers — Gemini, Epson, TTX printers. This card is not only for printers, but can be used where parallel data must be transmitted from the system. It has 12 TTL output lines which can be written and read under program control. Usually 8 are used for data and the others are used for handshaking with the external device. There is also an interrupt line, which the external hardware can 'tickle' for prompt immediate service. (Such applications as real time data acquisition).

The game port allows 4 paddles or two joysticks to be connected to the system. In fact any variable resistive element could be connected and the software would still give a value proportional to the resistance. This allows industrial applications to be realized easily with existing hardware.

$149.00

HARD DISK DRIVE AND CONTROLLER

The disk drive is a two platter random access device that fits into the same space as a 5¼" floppy disk drive. Each surface has one moveable head to service 306 cylinders with a total capacity of 10Mbytes (17 sectors/track, 512 bytes/sector, with 1224 tracks).

The hard disk controller shown in the picture can handle two such disks allowing a total of 20Mbytes of mass storage.

HARD DISK & CONTROLLER $1,669

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EPROM PROGRAMMER

This card can program any one of the following eproms: 2716, 2732, 2732a, 2764, and the new 27128s. Two sockets are available on the adaptor board, one for the 28 pin eproms the other for the 24 pins eproms. These sockets are standard sockets, however as an option ZIF sockets will be inserted. (We recommend ZIF sockets if large number of eproms will be programmed). Also as an option an extension board is available, this board attaches to the adaptor via a ribbon cable and extends out the back panel. This is to allow eproms to be programmed without removing the cabinet cover every time programming is to be performed. Also as a standard feature, the source software is supplied to allow users to modify the programme to suit their needs.

As an option a serial port can be included on the card; this serial port has the same features as the port described with the floppy disk controller (see the floppy disk description for documentation of the serial port).

MAIN EPROM PROGRAMMER CARD (WITH SOFTWARE)
With 2 standard EPROM sockets **$149.00**

EPROM PROGRAMMER WITH ZIF SOCKETS (WITH SOFTWARE)
With one 24-pin SIF socket and one 28-pin ZIF socket with provision for serial port **$189.00**

EXTERNAL CARD
Ready to plug into the main EPROM Card (includes one 24-pin and one 28-pin ZIF socket and cable). Saves you from opening the computer each time you want to program your EPROMS **$69.00**

SERIAL OPTION
For your main EPROM programmer. Provides you with a second RS232 serial port **$49**

Books

TOP APPLE BOOKS

Title	Price
1. Apple II User's Guide	$19.95
2. Apple II Circuit Description	29.95
3. Creative Apple	19.95
4. Basic Apple Basic	17.95
5. Apple Almanac	23.95
6. Using 6502 Assembly Language	23.95
7. Apple Logo	22.95
8. Dos Manuals	24.00
9. Apple Software '84	23.95
10. Blue Book	29.00
11. Beneath Apple Dos	25.95
12. Apple II Programmers Handbook	22.95
13. Visicalc Book — Apple ed.	18.95
14. Apple Fortran	28.00
15. 6502 Assembly Language Programming	24.95
16. What's Where in the Apple	32.95
17. Apple Connection	18.95
18. Kid's and the Apple	26.00

TOP IBM BOOKS

Title	Price
1. The IBM PC-DOS Handbook	$23.95
2. Your IBM Personal Computer	24.50
3. IBM PC & XT Owner's Manual	19.95
4. Learning IBM Basic	22.95
5. IBM Programs for Business	26.95
6. Assembler for the IBM & XT	23.95
7. PC DOS User's Manual	18.95
8. IBM Basic	22.95
9. IBM PC Assembly Language	26.00
10. Visicalc Book — IBM ed.	22.95
11. 1.2.3. Go	19.95
12. Using 1.2.3.	22.95
13. All About 1.2.3.	13.95
14. Accounts Basic Programs for the IBM PC	19.95
15. Interfacing to the IBM	22.95
16. 8087 — Applications & Programing for the IBM	26.00

Software

TOP APPLE SOFTWARE

Title	Price
1. Visicalc	$329.00
2. Wordstar	589.00
3. PFS File	159.00
4. Magic Window II	189.00
5. Bag of Tricks	46.00
6. Apple Mechanic	37.95
7. Locksmith 5.0	125.00
8. Flight Simulator II	52.95
9. Music Construction Set	48.95
10. Pinball Construction Set	48.95
11. Sargon III	39.95
12. Copy II Plus	48.95
13. Spellicopter	48.95
14. Creature Creator	48.95
15. BC Quest For Tires	48.95
16. Microsoft Applesoft Compiler	209.95
17. Chess — Odesta	86.95
18. Koala Pad	139.95
19. Applewriter IIe	249.00
20. Wizardry III	52.95

TOP IBM SOFTWARE

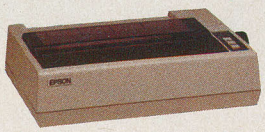
Title	Price
1. Lotus 123	$589.00
2. Wordstar	589.00
3. PFS File	152.95
4. Multiplan	295.00
5. Visi On Calc	489.00
6. D Base II	689.00
7. Flight Simulator	62.95
8. Accounting Plus	450/per
9. Mouse	309.00
10. Pac man	44.50
11. Flight Simulator	62.95
12. Donkey Kong	44.50
13. Zork	44.95
14. Suspended	58.95
15. The Witness	58.95
16. Ultima II	62.95
17. In Search of the most amazing thing	44.94
18. Story Machine	39.95
19. Digger	49.95

The books and software listed here is only a fraction of our huge range available in our stores.

Peripherals

Printers:

Gemini 10X $359.00



The most printer for your money; we have sold thousands of these printers. Features: • 9 x 9 Dot Matrix • 120 CPS • 4 Print Sizes • Maximum paperwidth 10" • Dot addressable graphics • User definable • Character set

Attention Apple owners, Special Package:

Gemini 10X and Parallel Card, ... $415.00

Parallel card is compatible with EPSON printers.

Gemini 15X, ... $599.00

Features: • 9 x 9 Dot Matrix • 120 CPS • 4 Print Sizes • Maximum paper width, 15" • Dot addressable graphics

Delta 10, ... $798.00

Features: • 160 CPS • dot matrix • serial port • parallel

Epson Printers RX 80 (replaces MX80) . . $495.00

• 100 CPS • dot matrix • tractor feed only

MX 100 . . . . . $995.00

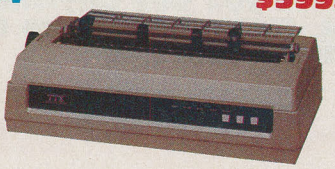
• 130 CPS • Tractor and friction feed • dot matrix

FX 100 . . . . . $1,069.00

• 160 CPS • tractor and friction feed

Panasonic Dot Matrix $399

Letter Quality Printers, TTX (Daisy Wheel), model 1014 $599.00



• 18 CPS • 132 character width • quiet operation • parallel and serial ports • optional daisywheels available• 15" carriage

Smith Corona, Ultrasonic III messenger $839.00

• computer compatible — optional interface lets typewriter double as electronic printer. • serial and parallel ports • snap in printwheels

Printer Paper:

8" printer paper, 500 sheets $9.95
8" printer paper, 1,500 sheets $29.95
8" printer paper, 2,000 sheets $32.95
Superb Printer Stands $39.00
(Allows you to store paper within the stand for easy feed.)

Ribbons:

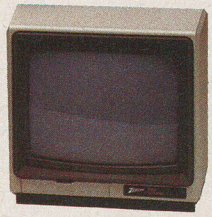
Gemini 10X Ribbon $6.50
Gemini 15X Ribbon, ... $6.50
Epson Ribbons for FX 80, RX 80 . . . . . $12.50
Epson Ribbons for MX 100, FX 100 . . . . . $25.00
TTX Ribbons $9.95

Other printer parts available, please call for pricing.

Monitors:

Zenith ZVM 123 Green $129.00
Zenith ZVM 122 Amber . . $139.00

(15 MHZ, ideal for Apple Tm, IBM, TM, and other personal computers).

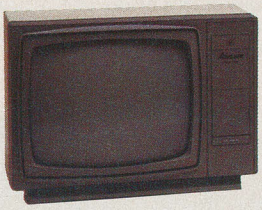


Zenith Colour Monitor, ZVM 131 $569.00

Features:
• 13"• 6 MHZ, RGB, or 25 MHZ composite• 40 x 25 characters

Amdek Green $135.00
Amdek Amber $139.00
Amdek Color 1, ... $525.00

• composite• 13"• 260 X 300,• 40 X 24 characters,• built-in speakers AMDEK, 1 year warranty,



Rolland DG CB-141 . . . . . $525.00

• composite 14"• 270 lines horizontal• 40 x 25• built-in speaker

Electrohome $489.00

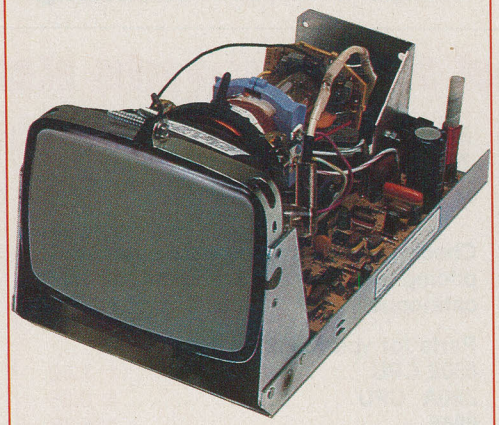
• colour• composite, will accept composite inputs with optional NTSC interface, call for pricing.

Electrohome RGB ECM-1302-2 $489.00

• 13"• 80 X 24 characters• RGB inputs

Outstanding buy for hobbyists:

Electrohome 5" green screen monitors $59.00



• brand new open frame monitor, requires 12V power supply
Sync separator board, (if needed) $13.00
Video Cables $1.89
Antiglare screens 12" $45.00

Modems:

EMP mini modem $119.00

• 300 baud• direct connect• originate only

SIGNALMAN 1200 . . . . . $595.00

• 300 and 1200 baud• auto answer and auto dial• direct connect

Hayes 1200 Smartmodem

• 1200 baud• auto answer• auto dial . . . $795.00

Micromodem IIe $495.00

• 300 baud• auto answer• auto dial• plugs directly into slot on APPLE TM

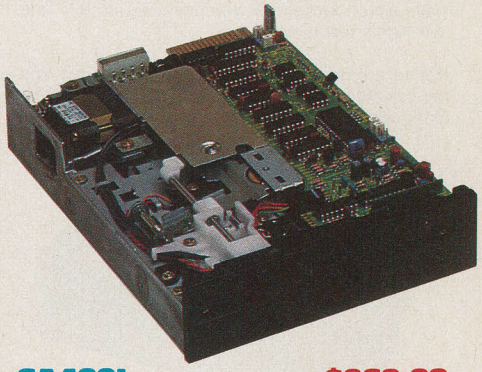
SUPER DIAL 300 Baud Acoustic Coupler Modem $49.00

(requires power supply, or use power from your computer)

Disk Drives:

THE BEST DEAL GOING, SA455 . . . . . 299.00

• 5¼" slimline double sided double density disk drive 360K storage capacity. IDEAL FOR IBM COMPUTERS.



SA400L $269.00

• 5¼" single sided disk drive

SA390 . . . . . $199.00

• disk drive mechanism (does not include analog board)• 5¼" single sided disk drive• ideal for use with the APPLE if you make your own analog board.

Shugart 3½" Disk Drive, 400K Storage $299.00

Seagate 10 Meg hard disk drive, 5¼" $1,299.00

Diskettes: Prices per 10

Dysan
5¼" SSDD $39.95
Verbatim
5¼" SSDD $34.00
5¼"DSDD $48.95
8" DS DD $86.00
Note: Quantity pricing also available, call and inquire
Maxell
5¼" SSDD, soft-sectored $34.00
5¼" DSDD, soft sectored $58.95
8", SSDD, soft sectored $86.00
8", DSDD, soft-sectored $92.00
Note: hard sector disks also available in 5¼" and 8" . . . . . $Call
CDC, 5¼" SSDD $26.95
Accutrak, 5¼" SSDD (with plastic case.) . . . $26.95
with plastic case.

Joysticks:

Wico Red Ball $44.95
Kraft $66.00
Kraft Paddles $56.95
TG Deluxe $75.00
Hayes Mach II $54.00
Hayes Mach III $62.95
Econo Model $19.95
TG Track Ball $85.00
Koala Pad, graphics tablet, includes illustrator software for Apple TM $139.00
Sweet Micro Systems mocking board $154.00
Speech Synthesizer chip for above $ call for pricing
RF Modulators $18.95

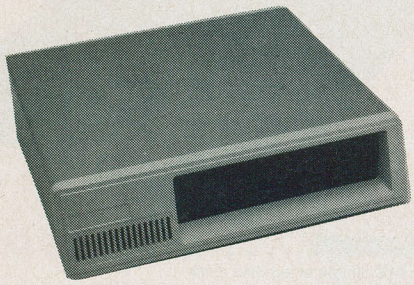
Exceltronix

HOBBYIST DELIGHTS AT UNBEATABLE PRICES!

The Best IBM Compatible Case . . $89.00

This attractive case made out of metal and aluminum, with a superb paint job looks like the real thing. It is made so that 8088 peripheral boards can be mounted securely to the case, rather than hanging loose in the motherboard. This case is ideal for use with the 8088 board or 6502 boards. Customers have remarked that they have not seen any other case which looked as well designed as this one. We highly recommend it.

Notice the mounts for your 8088 peripherals and the pre-punched mounting and ventilation holes, along with the two disk drive supports.



Superb 6502 ABS Case and Keyboard $190.00

Ideal for 6502 boards, including a reliable heavy duty keyboard with upper and lower case characters, and numeric keypad.

Also available, a very attractive but low cost aluminum case $19.95
Aluminum case with keyboard $69.00

IBM Compatible Keyboards . . . $189.00

We had looked at about 8 companies keyboards, including several from Taiwan, before we came to the conclusion, that these keyboards were not only super reliable and had a nice feel to them, but were also most economical. This is why we selected and ordered thousands of Cherry and Maxiswitch keyboards.

This professional IBM TM compatible keyboard with serial output, is ready to plug into an IBM or a compatible computer. Available now, high quality keyboards made for professional use by Cherry and Maxiswitch. They are both remarkably good, but it's your choice. Both are priced at $189.00.

MULTIFLEX SERIAL KEYBOARD ENCODER $69.00

- changes the serial code into parallel ASCII output with programmable characters.
- Ideal for your Apple, or any 6502 system with ASCII input.

You will love it and to the best of our knowledge, only we carry such a deluxe feature board.
WE also offer other brand new ASCII keyboards for as low as UNBEATABLE!

MUSIC BOARDS FOR YOUR APPLE . . . . . call for price

MAKE YOUR APPLE 8088 compatible call for pricing

Even though we sell bare boards for many of our products, we recommend to you to buy our finished products and in most cases, we challenge you that it will cost you as much to buy all the parts and build it, as it will cost you to buy a professionally built, wave/flow soldered, and ultrasonically cleaned boards, which have been professionally tested, and are guaranteed, and allow you to learn and enjoy your computer, rather than running around town chasing that odd value capacitor or these days many hard-to-get chips. On top of all these frustrations, you try to debug your board, in many cases having to pay to get your board(s) up and running. But if you are still not convinced here we offer you the widest selection, at the best prices (for prime parts anywhere) with a wide selection of parts for your 6502 and 8088 board and the peripheral boards. (Before you buy, calculate!)

Ready Built or Kit?

Come to Exceltronix before you buy anywhere else. We've been here for nearly 5 years.

8088 Boards and Peripherals Hard-to-get-Parts

DIP switch, 8-position	$ 2.69
5-pin DIN connectors	$ 2.50
Card Edge Connectors (62-pin)	$ 2.99
Delay Line	$ 8.95
4.7K 8-pin SIP	$ .69
8088	$29.95
8237A-5	$34.95
8250	$19.95
8253A-5	$18.00
8288	$18.95
8259	$11.95
8255A-5	$15.95
6845	$16.75
8272 or NEC 76S Disk Controller	$47.99
74LS280	$ 3.65
74LS125	$ 1.20
74S157	$ 1.99
74LS244	$ 1.89
74LS245	$ 2.60
74LS273	$ 1.99
74LS373	2.19
74LS670	$ 1.49
74LS85	$ 1.65
74LS322	$ 7.75

Check your microprocessor and 74LS pricing on pages 13 and 14 of this catalogue.

Parts for your 6502 System

6502 CPU	$ 7.60
Z80A CPU	$ 6.85
6845	$16.75
74LS367	$ .99
74LS259	$ 1.89
74S74	$ 1.20
74LS322	$ 7.75
74LS161	$ 1.60
4116 (150nS)	$ 1.95
4164 (150nS)	$ 9.95
2114 (200nS)	$ 2.99
2716	$ 6.50
2732	$ 9.95
2764	$13.95

Hard-to-get Passive Parts

14.318 MHz Crystal	$ 2.95
17.43 MHz Video Bd Crystal	$ 4.25
4 MHz Crystal	$ 3.99

(Huge variety of crystals available at $4.50 each type).

MPSA13 transistor	$ .65
2N3904 transistors	$ .34
2N4258	$ .69

Large selection of SIPs (single in line resistor packages), all at 69c.

RCA Rightangle Jack socket	$ .75
50pF variable capacitor	$ .85
Card edge connectors	$ 2.89

In addition to our own incredibly successful 6502 and 8088 boards, we also supply the JLS and HAL boards.

Microprocessor Chips

6500 Series

6502	8-bit CPU (1 MHz)	7.50
6502A	8-bit CPU (2 MHz)	8.50
6522	VIA Versatile Interface Adaptor	8.99
6532	RIOT (128x8 RAM, I/O, Timer)	9.75
6545	CRT Controller	16.50
6511	ACIA Async. Comm. Interface Adaptor	18.00

6800 Series

6800	8-bit CPU (1 MHz)	6.50
6802	On Chip 128 x8 1MHz CPU	7.60
68B00	8-bit CPU (2 MHz)	7.39
6809	8/16-bit CPU (1 MHz)	16.50
68B09	8/16-bit CPU (2 MHz)	26.75
6810	128x8 static RAM	3.70
6821	PIA Periphrial Interface Adaptor	3.59
6840	Programable Timer	8.10
6844	DMA Controller	14.00
6845	CRT controller	16.75
68A45	CRT controller	17.95
6847	Video Display Generator	16.00
6850	ACIA	3.95
6852	Syncronous Serial Data Adapter	5.80
6860	0-600 Baud Modem	15.90

68000 Series

68000L8	16-bit CPU (8 MHz)	78.50
68000L10	16-bit CPU (10 MHz)	99.00
68008	16-bit CPU (8 bit data path)	52.00
68230	Parallel Interface Adapter	21.95
68450	6MHz 16-bit DMA Controller	250.00
68451	Memory Management Controller	189.00
68561	MPCC (68000 Compatible)	96.00

8080 Series

8080	8-bit CPU	9.80
8085	8-bit CPU	13.50
8212	8-bit I/O Port	3.50
8214	Priority Interrupt Controller	4.99
8216	4-bit Bidirectional Bus Driver	2.99
8224	Clock generator for 8080/8085	9.50
8226	Inverting Bus Driver	9.80
8228	System controller for 8080/8085	9.95
8251A	Programmable Communications Interface	10.50
8253A-5	Programmable Internal Timer	18.00
8253	Programmable Interval Timer	8.90
8255	Programmable Interface Adapter	8.25
8255A-5	Programmable Interface Adaptor	15.95
8257-5	Programmable DMA Controller	9.50
8259	Programmable Interrupt Controller	11.95
8272	Programmable Floppy Disk Controller	45.75
8275	Programmable CRT Controller	40.00
8279-5PC	Programmable Keyboard Display Interfac.	9.90
8282PC	Octal latch, non inverting	15.95
8283PC	Octal latch, inverting	6.59
8284	Clock gen and driver	12.95
8286	8-Bit Bus trans. Non-Inverting	8.75
8287PC	8-Bit Bus trans. Inverting	8.69
8741ADC	Univ. Programmable Interface	34.95
8748DC	CPU, 4K EPROM, I/O	35.95
8749DC	CPU, EPROM, RAM, I/O	39.95
8755ADC	2048 x 8 EPROM, I/O	37.95

8086 Series

8086	16-bit CPU	39.00
8088	16-bit CPU c/w 8-bit data bus	29.95
8087	Math Processor	249.00
8089	I/O Processor	
8282	Octal Latch	14.00
8283	Inverting Octal Latch	6.69
8284	Clock Generator for 8086/8088	12.00
8288	Bus Controller	18.95
8289	Bus Arbiter	46.95
8237A5		39.00
8272		47.99

Z80 Series

Z80A-CPU	8-bit CPU (4 MHz)	6.85
Z80B-CPU	8-bit CPU (6 MHz)	14.85
Z80A-PIO	Parallel I/O	5.95
Z80A-CTC	Counter Timer	5.95
Z80A-DART	Dual Asyncronous Receiver Transmitter	12.95
Z80A-DMA	Direct Memory Access	18.95
Z80A-SIO-0	Serial I/O ver. 0	18.95

Misc. Microprocessors and Periphrial Chips

AY3-1015	UART (Single 5V Supply)	8.25
AY5-1013	UART	6.89
S1602	UART	4.75
TMS9918	Sprite Graphics Generator	46.45
TMS99532	FSK Modem	47.99
COM5016	Dual Baud Rate Generator	18.10
COM8116	Dual Baud Rate Generator (5V supply only)	16.75
KR3600	Keyboard Encoder	16.50
MSM5832	Real-time Clock	18.10
MSM58321	Real-time Clock	
SND5037	CRT Video Timer Controller	32.25
WD2143	4-phase Clock Generator for Floppy Disks	
FDC1771	Single Density Disk Controller	19.00
FDC1793	Double Density Disk Controller	47.00
FDC1795	Double Density/Sided Disk Controller	84.75
FDC2793	Dbl. Density Disk Controller c/w precomp.	55.00
FDC2795	DDDS Disk Controller c/w precomp.	59.95
FDC9216	Floppy Disk Data Separator	18.65

CMOS

4000	Dual 3 input NOR gate	.49
4001	Quad 2 input NOR gate	.49
4002	Dual 4 input NOR gate	.49
4006	18 static shift register	1.24
4007	Dual complementary pairs/inverters	.51
4008	4 bit full adders	1.25
4009	Hex buffer/converter (inverting)	1.20
4010	Hex buffer/converter	1.05
4011	Quad 2 input NAND gate	.49
4012	Dual 4 input NAND gate	.49
4013	Dual D Edge triggered flip flop	.79
4014	8 bit static shift register	1.25
4015	Dual 4 bit static shift register	1.25
4016	Quad bilateral switch	.82
4017	Decade counter/divider	1.29
4018	Presettable divide by N counter	1.25
4019	Quad and/or select gate	.75
4020	14 stage binary/ripple counter	1.29
4021	8 bit static shift register	1.29
4022	Divide by 8 counter/divider	1.27
4023	Triple 3 input NAND gate	.49
4024	7 stage binary counter	1.20
4025	Triple 3 input NOR gate	.49
4026	Decade counter/divider	1.99
4027	Dual JK flip flop	.78
4028	BCD to decimal decoder	1.19
4029	Presettable up/down binary/decade counter	1.29
4030	Quad XOR gate	.50
4033	7 segment decaded counter	1.76
4034	8 stage universal bus register	2.57
4035	4 stage PISO shift register	1.15
4038	Triple serial register	2.25
4040	12 stage binary/ripple counter	1.25
4041	Quad true complement buffer	1.17
4042	Quad clock D latch	1.12
4043	Quad tri state NOR R/S latch	1.15
4044	Quad tri state NAND R/A latch	1.15
4046	Micropower phase locked loop	1.24
4047	Low power monostable/astable multivibrator	1.19
4049	Inverting hex buffer	.79
4050	Hex buffer	.79
4051	Single 8 channel multiplexer/demultiplexer	1.27
4052	Dual 4 channel multiplexer	1.27
4053	Triple 2 channel multiplexer/demultiplexer	1.27
4054	4 segment display driver	1.75
4055	BCD to 7 segment recorder/LCD driver	1.75
4056	BCD to 7 segment recorder/LCD driver	1.75
4060	14 stage binary counter/oscillator	1.29
4066	Quad bilateral switch	.79
4068	8 input NAND gate	.47
4069	Hex inverter	.47
4070	Quad 2 input XOR gate	.47
4071	Quad 2 input OR gate	.47
4072	Dual 4 input OR gate	.47
4073	Triple 3 input gate	.47
4075	Triple 3 input OR gate	.47
4076	4 bit D register	1.17
4078	8 input NOR gate	.47
4081	Quad 2 input AND gate	.47
4082	Dual 4 input AND gate	.58
4086	Expandable 4 by 2 AND/OR invert gate	.67
4093	Quad 2 input NAND Schmitt trigger	.75
4094	8 stage shift/store register	2.50
4097	Diff 8 channel analog mux/demux	2.30
4099	8 bit addressable latch	1.65
4501	Industrial control unit	4.80
4502	Strobex Hex inverter/buffer	1.25
4503	Hex tri state buffer	1.69
4504	Hex level shifter	4.00
4506	Dual Expandable AOI gate	2.50
4508	Dual 4 bit latch tri-state	2.85
4510	BCD up/down counter	1.19
4511	BCD to 7 segment latch/decoder/driver	1.50
4512	8 channel data separator	1.10
4514	1 of 16 decoder/demultiplexer	2.85
4515	1 of 16 decoder/demultiplexer	2.85
4516	Binary up/down counter	1.10
4518	Dual BCD up counter	1.19
4519	4 bit AND/OR select gate	1.45
4520	Dual binary up counter	1.15
4521	24 state frequency divider	3.99
4522	BCD divide by N counter	1.85
4526	4 bit binary divide by N counter	1.60
4527	BCD rate multiplier	1.25
4528	Dual retriggerable/resettable monostable	1.10
4529	Dual 4 channel mux	2.30
4530	Dual 5 input majority logic gate	1.65
4531	12 bit parity generator/checker	1.50
4532	8 bit priority encoder	1.10
4534	Real time 5 decade counter	7.99
4536	Programmable timer	5.55
4538	Dual precision monostable multivibrator	2.87
4539	Dual 4 channel digital multiplexer	1.75
4541	Quad 2 input analog mux	2.10
4543	BCD to 7 segment latch/decoder/driver	1.69
4553	3 digit BCD counter	5.05
4555	Dual binary 1 of 4 decoder	1.49
4556	Dual binary 1 of 4 decoder	1.49
4557	1-6 bit shift register	5.87
4558	BCD to 7 segment decoder	3.55
4560	NBCD adder	5.69
4561	9's complimenter	2.69
4562	128 bit static shift register	8.99
4556	Industrial time base generator	3.15
4568	Phase comparator/programmable counter	6.45
4572	Hex gate	1.25
4573	Quad programmable op amp	3.43
4575	Quad programmable comparator	4.25
4580	4 x 4 multiport register	6.49
4581	4 bit A/U	3.99
4582	Carry look ahead generator	1.75
4583	Dual Schmitt trigger	2.18
4584	Hex Schmitt trigger	1.29
4585	4 bit magnitude comparator	1.25
4702	Programmable bit rate generator	11.99

Linear

109	1A +5V regulator	8.38
124	Quad op amp	3.95
139	Quad comparator	3.95
148	Quad op amp	5.50
300	General purpose op amp	4.10
301	General purpose op amp	.75
305	Voltage regulator	1.15
306	Improved voltage comparator	2.05
307	Op amp	1.25
308	Super beta op amp	2.50
309	+5V regulator	2.27
310	Voltage follower	3.38
311	Voltage compatator	1.50
317	3 terminal adjustable regulator	3.71
318	Precision high speed op amp	1.89
319	High speed dual comparator	2.55
323	3A +5V regulator	7.95
324	Quad op amp	1.33
337	3 terminal negative regulator	2.23
339	Quad comparator	1.25
348	Quad low-power 741	.99
350	3A 3 term. positive adjust. regulator	7.25
355	FET input op amp	1.61
356	Monolithic J-FET input op amp	2.44
357	Monolithic J-FET input op amp (uncompensated)	3.12
358	Dual version of 324	1.69
380	2W audio amp	1.20
393	Dual version of 339	.91
398	Sample and hold amplifier	5.94
555	Timer	.58
556	Dual timer	1.02
558	Quad timer	2.95
567	Tone decoder	1.69
709	Op amp	1.39
710	Differential comparator	1.32
711	Dual channel differential comparator	1.30
714	Precision op amp	5.16
715	High speed op amp	5.25
723	Voltage regulator	1.39
725	Instrumentation op amp	3.69
726	Temperature controlled differential pair	65.25
727	Temp. controlled differential preamplifier	72.95
733	Differential video amp	1.95
739	Dual high performance op amp	2.25
741	Operational amplifier	1.25
747	Dual op amp	1.02
748	Op amp	1.14
749	Dual audio preamplifier	3.38
759	Power op amp	3.99
760	High speed differential comparator	11.95
776	Multi-purpose programmable op amp	1.95
796	Modulator/demodulator	3.25
1372	RF modulator	4.30
1436	High voltage op amp	4.49
1458	Dual op amp	1.70
1489	Quad RS232 line receiver	1.09
1495	Multiplier	5.25
1496	Modulator/demodulator	3.10
1524	Pulse width mod. reg.	15.35

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Linear

1558	Dual op amp	2.99
1595	Four quad multiplier	7.78
1596	Modulator/demodulator	5.49
1800	Demodulator	6.25
1889	Video modulator	6.25
3900	Quad op amp	0.95
26LS29	Quad RS423 line driver	5.49
26LS30	Quad RS422/432 line driver	3.95
26LS31	Quad differential line driver RS422	2.70
26LS32	Quad differential line driver RS422	2.70
26LS33	Quad differential line driver RS422	3.95
3470	Floppy disk read amplifier	9.50
3486	Quad RS422/423 line receiver	3.35
3487	Quad line driver RS422	3.35
76477	Analog complex sound generator	5.00
76478	Analog complex sound generator c/w amp	6.90
76489	Microprocessor cont. complex sound generator	8.30
8T26	Quad tri-state bus transceiver	1.70
8T28	Quad tri-state bus transceiver	2.59
TL070	Low noise bifet op amp	.79
TL071	Low noise bifet op amp	.69
TL072	Low noise bifet op amp	1.09
TL074	Low noise bifet op amp	2.10
TL075	Low noise bifet op amp	3.10
TL080	General purpose bifet op amp	.60
TL081	General purpose bifet op amp	.53
TL082	General purpose bifet op amp	.99
TL083	General purpose bifet op amp	1.66
TL084	General purpose bifet op amp	4.00
TL497	Switching voltage regulator	2.75
ULN2002	7 segment transistor array	1.35
ULN2003	7 segment transistor array	1.35
ULN2004	7 segment transistor array	1.75
XR200	Multifunction I.C.	67.75
XR205	Monolithic waveform generator	8.10
XR210	FSK modulator/demodulator	5.95
XR215	Phase lock loop	5.95
XR240	PCM repeater	11.95
XR320	Monolithic timing circuit	1.64
XR1310	Stereo demodulator	1.25
XR2206	Monolithic function generator	4.95
XR2207	Voltage controlled oxcillator	3.45
XR2208	Operation multiplier	3.45
XR2209	Precision oscillator	3.45
XR2211	FSK demodulator/tone decoder	3.90
XR2212	Precision phase locked loop	5.45
XR2213	PLL/tone decoder	5.45
XR2240	Programmable timer counter	1.99
XR2242	Long range timer	2.25
XR2567	Dual monolithic tone decoder	2.40
XR4739	Dual low noise op amp	1.55
XR14412	FSK modem system	9.39

Memories

STATIC RAMS

2101	250nS 256x4	22 PIN	4.69
2102L	250nS 1Kx1	16 PIN	2.19
2114L	200nS 1Kx4	18 PIN	2.99
2149-045	45nS 1Kx4	18 PIN	15.75
2016	150nS 2Kx8	24 PIN	9.95
6116	150nS 2Kx8 CMOS	24 PIN	10.95
6116L	150nS 2Kx8 CMOS	24 PIN	11.95
6514	450nS 1Kx4 CMOS		5.95

DYNAMIC RAMS

4116	150nS	1.95	16Kx1
4116	200nS	1.70	16Kx1
2118	200nS	7.85	16Kx1
2118	120nS	9.50	16Kx1 SINGLE 5V SUPPLY
4164	200nS	8.95	64Kx1
4164	150nS	9.95	64Kx1
4164	120nS	12.00	64Kx1
41256	150nS	*	256Kx1

EPROMS

2716	2Kx8	450nS	6.50
2716	2Kx8	350nS	7.50
2732	4Kx8	450nS	8.95
2732A	4Kx8	350nS	9.95
2532	4Kx8	450nS	9.95
2764	8Kx8	450nS	13.95
2564	8Kx8	450nS	28.95
27128	16Kx8	450nS	59.00

74LS00 Series TTL

74LS00	Quad 2 input NAND gate	.59
74LS01	Quad 2 input NAND gate O/C	.59
74LS02	Quad 2 input NOR gate	.59
74LS03	Quad 2 input NOR gate O/C	.59
74LS04	Hex inverter	.69
74LS05	Hex inverter O/C	.59
74LS08	Quad 2 input AND gate	.59
74LS09	Quad 2 input AND gate O/C	.59
74LS10	Triple 3 input NAND gate	.59
74LS11	Triple 3 input NAND gate O/C	.59
74LS12	NAND gate inverter	.59
74LS13	Dual Schmidt trigger	.89
74LS14	Hex Schmidt trigger inverter	1.30
74LS15	Triple 3 input NAND gate	.99
74LS20	Dual 4 input NAND gate	.69
74LS21	Dual 4 input NAND gate	.67
74LS22	Dual 4 input NAND gate	.99
74LS24	Quad 2 input NAND Schmidt trigger	1.39
74LS26	Quad 2 input positive NAND gate	.82
74LS27	Triple 3 input NOR gate	.79
74LS28	Quad 2 input NOR buffer	.85
74LS30	8 input NAND gate	.89
74LS32	Quad 2 input NOR gate	.79
74LS33	Quad 2 input NOR gate O/C	.65
74LS37	Quad 2 input NAND gate	.75
74LS38	Quad 2 input NAND gate O/C	.79
74LS42	BCD to decimal decoder	.95
74LS47	BCD to 7 segment decoder/driver	1.49
74LS48	BCD to 7 segment decoder/driver	1.89
74LS49	BCD to 7 segment decoder/driver	1.60
74LS51	And/or invert gate	.75
74LS54	4 wide and/or invert gate	.79
74LS55	2 wide 4 input and/or invert gate	.75
74LS63	Hex current sensing switch	1.95
74LS73	Dual JK flip flop with clear	.89
74LS74	Dual D flip flop	.79
74LS75	4 bit bistable latch	.79
74LS76	Dual JK master/slave flip flop	.99
74LS77	4 but bistable latch	1.45
74LS78	Dual JK flip flop preset, common clear	.99
74LS83	4 bit binary full adder	1.32
74LS85	4 bit magnitude comparator	1.65
74LS86	Quad input XOR gate	.95
74LS90	Decade counter	1.20
74LS91	8 bit shift register	1.20
74LS92	Divide by 12 counter	1.20
74LS93	4 bit binary counter	1.20
74LS95	4 bit right/left shift register	1.69
74LS96	5 bit shift register async. preset	1.70
74LS107	Dual JK flip flop with clear	.95
74LS109	Dual JK pos. edge triggered flip flop	.99
74LS112	Dual JK edge triggered flip flop	.99
74LS113	Dual JK edge triggered flip flop	.99
74LS114	Dual JK edge triggered flip flop	.99
74LS122	Retriggerable monostable multivibrator	1.19
74LS123	Dual retriggerable monostable multivibrator	1.55
74LS125	Tri state quad bus buffer	1.20
74LS126	Quad 3 state buffer	.99
74LS132	Quadruple 2 input NAND Gate	1.28
74LS133	13 input NAND gate	.99
74LS136	Quad XOR gate	.95
74LS137	3 of 8 decoder/demultiplexer	.99
74LS138	3 to 8 decoder/multiplexer	.99
74LS139	Dual 1 of 4 decoder/demultiplexer	.99
74LS145	BCD to decimal decoder/driver	1.65
74LS147	10/4 priority encoder	2.99
74LS148	8 to 3 line priority encoder	2.99
74LS151	8 channel digital multiplexer	.99
74LS153	Dual 4/1 multiplexer	.99
74LS154	4 to 16 decoder multiplexer	2.99
74LS155	Decoder/demultiplexer	1.69
74LS156	Decoder/demultiplexer	1.69
74LS157	Quad selector/multiplexer	1.19
74LS158	Quad 2 input multiplexer (inverting)	1.90
74LS160	Decade counter with async. clear	1.50
74LS161	Sync. 4 bit counter	1.60
74LS162	Sync. 4 bit counter	1.69
74LS163	Sync. 4 bit counter	1.60
74LS164	8 bit serail shift register	1.60
74LS165	Parallel load 8 bit shift register	1.89
84LS166	8 bit PISO shift register	2.75
74LS168	Up/down decade counter	2.69
74LS169	4 bit sync. binary counter	2.59
74LS170	4 x 4 register file	2.70
74LS173	4 bit tri state register	1.38
74LS174	Hex D flip flop with clear	1.29
74LS175	Quad D flip flop with clear	1.29
74LS181	4 bit ALU	3.50
74LS182	Look ahead carry	2.75
74LS183	Dual carry/save full adder	6.00
74LS189	64 bit RAM	6.00
74LS190	Sync. up/down counter BCD	1.69
74LS191	Sync. up/down counter binary	1.65
74LS192	Binary up/down counter	1.65
74LS193	Binary up/down counter	1.65
74LS194	4 bit bi-directional shift register	1.19
74LS195	4 bit shift register	1.39
74LS196	Decade counter	1.99
74LS197	Presettable binary counter	1.99
74LS219	64 bit RAM	5.99
74LS221	Dual monostable multivibrator	1.89
74LS240	Octal inverting bus driver	1.69
74LS241	Octal bus driver	1.99
74LS242	Quad inverting transceiver	1.99
74LS243	Quad transceiver	1.99
74LS244	Tri state octal driver	1.89
74LS245	Octal bus transciever	2.60
74LS227	BCD to 7 segment decoder driver	2.53
74LS248	BCD to 7 segment decoder driver	2.53
74LS249	BCD to 7 segment decoder driver	2.53
74LS251	Tristate data selector multiplexer	.99
74LS253	Dual 4 bit multiplexer	1.20
74LS257	Quad 2 input multiplexer	.99
74LS258	Quad 2-1 multiplexer	.99
74LS259	8 bit addressabe latch	1.89
74LS260	Dual 5 input NOR gate	1.19
74LS266	Quad 2 input XNOR O/C	1.05
74LS273	Octal D flip flop	1.99
74LS275	7 bit slice Wallace tree	5.55
74LS279	Quad S-R latches	1.10
74LS280	9 bit odd/even parity checker/generator	3.65
74LS283	4 bit binary full adder	1.29
74LS289	64 bit RAM	6.25
74LS290	Decade counter	1.69
74LS293	4 bit binary counter	1.89
74LS295	4 bit shift register	1.99
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74LS299	8 bit storage register	3.65
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74LS321	Crystal oscillator	5.65
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74LS323	8 bit bidirectional universal shift	7.65
74LS348	8 to 3 priority encoder	1.99
74LS352	Dual 4 bit multiplexer	3.25
74LS353	Dual 4 bit multiplexer	1.99
74LS354	Data selector multiplexer	1.99
74LS355	Data selector multiplexer	5.95
74LS356	Data selector multiplexer	5.95
74LS357	Data selector multiplexer	5.95
74LS365	Hex bus driver tri state	.99
74LS366	Hex bus driver (inverted output)	.99
74LS367	Hex bus driver	.99
74LS368	Hex bus driver (inverted output)	.99
74LS373	Octal transparent latch	2.19
74LS374	Octal dual flip flop	2.19
74LS375	4 bit bistable latch	1.15
74LS377	Octal D register	2.19
84LS378	Hex D register	2.19
74LS379	4 bit register	2.19
74LS380	Multi function octal generator	10.48
74LS381	4 bit ALU	5.43
74LS384	8 bit multiplier	9.88
74LS386	Quad 2 input XOR gate	.99
74LS390	Dual decade counter	1.25
74LS393	Dual 4 bit binary counter	1.99
74LS395	Tri state shift register	1.25
74LS396	Octal storage register	3.99
74LS398	Quad D flip flop	3.99
74LS399	Quad 2 input multiplexer with storage	2.95
74LS629	Voltage controlled oscillator	3.60
74LS670		1.49

74S00 Series TTL

74S00	Quad 2 input NAND gate	$ .79
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74S03	Quad 2 input NOR gate O/C	.79
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74S05	Hex inverter O/C	.79
74S08	Quad 2 input AND gate	.79
74S09	Quad 2 input AND gate O/C	.79
74S10	Triple 3 input NAND gate	.79
74S11	Triple 3 input NAND gate O/C	.79
74S15	Triple 3 input AND gate O/C	.79
74S20	Dual 4 input NAND gate	.79
74S22	Dual 4 input NAND gate O/C	.79
74S30	8 input NAND gate	.79
74S32	Quad 2 input NOR buffer	.85
74S37	Quad 2 input NAND buffer	2.49
74S38	Quad 2 input NAND buffer O/C	2.49
74S40	Dual 4 input NAND buffer	.99
74S74	Dual D flip flop	1.20
74S85	4 bit magnitude comparator	2.95
74S86	Quad 2 input XOR gate	1.65
74S109	Dual JK positive edge triggered flip flop	2.69
74S112	Dual JK flip flop	1.29
74S113	Dual JK negative edge triggered flip flop	1.45
74S114	Dual JK negative dge triggered flip flop	1.45
74S124	Dual VCO	4.50
74S132	Quad 2 input Scmitt trigger NAND	2.40
74S128	3-8 decoder/multiplexer	1.99
74S139	Dual 2-4 decoder/multiplexer	1.99
74S140	Quad line driver	1.60
74S151	8 channel digital multiplexer	1.99
74S153	Dual 4-1 multiplexer	1.99
74S157	Quad 2 input multiplexer	1.99
74S158	Quad 2 input multiplexer	1.99
74S160	Decade counter with async. clear	5.89
74S161	Sync. 4 bit counter	5.99
74S162	Sync. 4 bit counter	6.99
74S163	Sync. 4 bit counter	5.00
74S168	4 bit up/down sync. counter	7.44
74S169	4 bit sync. counter	7.59
74S174	Hex D flip flop with clear	2.50
74S175	Quad D flip flop with clear	2.50
74S181	ALU	5.99
74S182	Look ahead carry generator	3.75
74S189	16 x 4 RAM	5.50
74S195	4 bit parallel access shift register	2.99
74S196	Presettable decade counter	4.95
74S197	Presettable binary counter	4.95
74S201	256 bit RAM	8.95
74S240	Octal line driver	3.99
74S241	Octal line driver	3.99
74S244	Octal line driver	4.75
74S251	Tri-state data selector multiplexer	2.65
74S260	Dual 5 input NOR gate	1.75
74S283	4 bit binary full adder	4.99
74S289	16 x 4 RAM	5.20
74S299	8 bit universal shift storage register	9.99
74S373	Octal D latch	3.99
74S374	Octal D latch	3.99

We apologize for the high pricing. This is due to the severe parts shortages and our costs have in most cases doubled. Unfortunately this shortage is expected to last until 1985.

We do however have an enormous inventory of hundreds of thousands of parts and we can supply industry at bulk rate pricing.

Despite the rise in prices, we are sure you will find our pricing most competitive and our stock position excellent.

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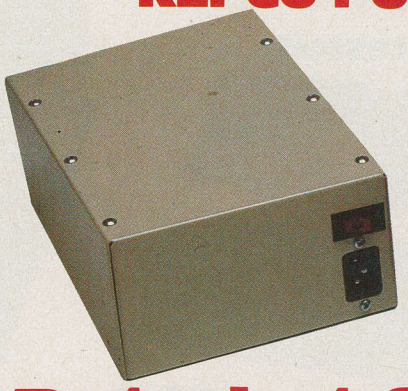

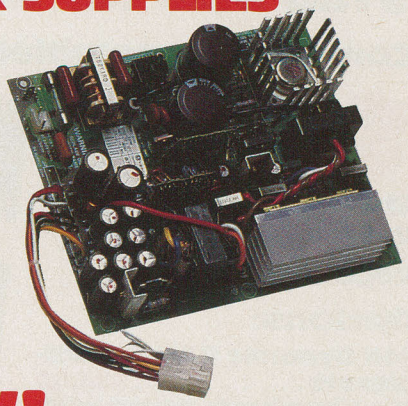

Rated at 90W!

RFI filter and fuse on board

Open Fame . . . . . $ 69.00

Cased with powerful, 3" silent fan . . . $139.00

Quantity discounts available. Dealer enquiries invited.

Hydro approved, Cased version is designed so that the fan draws the air from inside of the system, through the power supply box and out. Beautifully quiet, switching power supply.

After evaluating a dozen power supply manufacturers, we found a supply, which truly exceeded our expectations. This KEPCO power supply is a high quality switching power supply, which meets industrial needs and will superceed hobbyists requirement. We highly recommend it. This supply is made in JAPAN, not TAIWAN. This power supply module would normally cost approximately $100.00 wholesale price, in thousand lots. Due to the fact that we purchased over 5 thousand of these units, which we also use in production, we would like to pass along the savings... Take advantage of this opportunity.

Ratings: Dual

12 Volts, 12 V at 2.8A

12 V at 2 A -12V at .5A

+ 5 V at 5.0A We tested the + 5V, it works beautifully beyond 6 A. We also tested these power supplies at much heavier loads and they worked perfectly. You can get considerably better performances from these supplies, when they are fan cooled. Documentation and schematics are provided with each KEPCO power supply.

Ideal for 8088 and other IBM compatible system. Will handle up to 4x5 ¼" disk drives with power to spare.

Boschert Power Supply $199.00

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7805 + 5V 1A	.99
78L05 + 5V .1A	.75
78H05 + 5V 5A	9.44
78P05 + 5V 10A	14.97
7806 + 6V 1A	.99
78L06 + 6V.1A	.75
7812 + 12V 1A	.99
78L12 + 12V .1A	.75
78H12 + 12V 5A	10.95
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7824 + 24V 1A	.99
78GUIC Adjust. 1A	1.80
78HGASC Adjust. 5A	11.47
78S40 Switching regulator	3.84

NEGATIVE:

7905 -5V 1A	.99
79L055V. 1A	.75
7906 -6V 1A	.85
7912 -12V 1A	.85
79L12-12V. 1A	.99
7915 -15V 1A	.99
79GUIC. Adjust. 1A	1.65
79HGASC Adjust 5A	17.99

See page 14 for more hobby pricing and our super deal on power supplies.

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Multiflex Z80A

S100 Starter System

Complete, assembled and tested

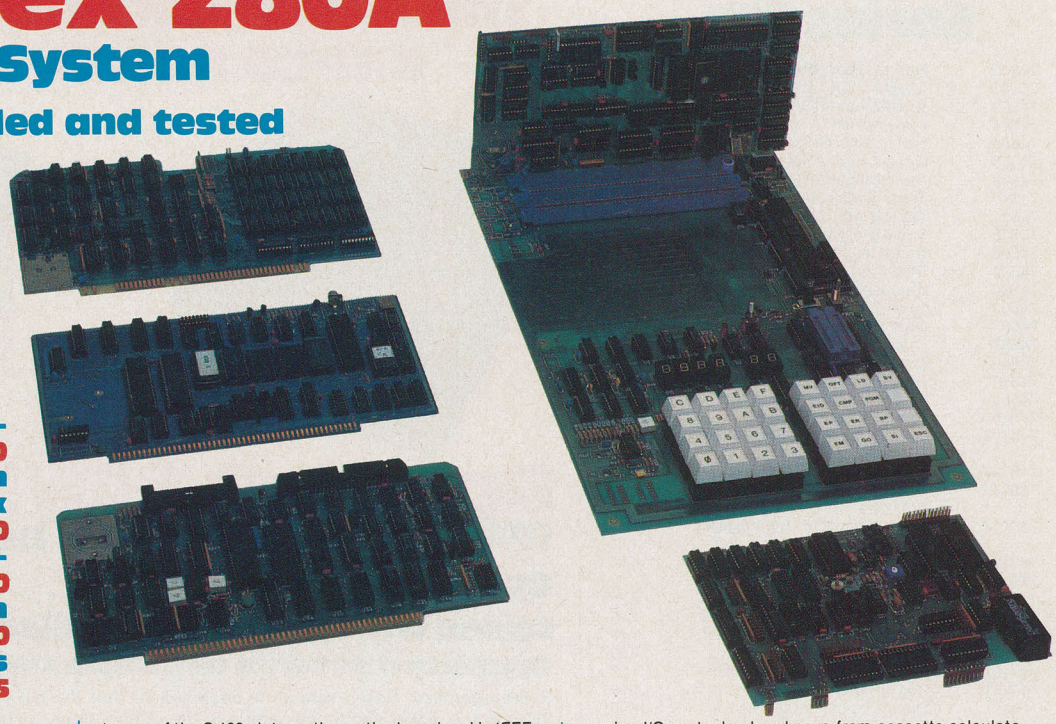
$299

This price good until June 1st, 1984.

Regular $450

Options:

64K Dynamic RAM & Multiplexers $88.00
Big Piggyback Board with RS232 and Real Time Clock $179.00
RS232 Option for Motherboard $38.00
DC to DC Converter Option $29.00
Extra S-100 Connectors (each) $5.95



MULTIFLEX's Z80 computer is a versatile and expandable stand-alone computer system designed and built right here in Canada. It uses the newest technology to provide the user with the most capabilities for the smallest price-tag. Its adaptability to any situation and extremely low cost allow it to be used in many applications ranging from a trainer to a complete CP/M-based computer comparable to the best on the market, at a fraction of the price.

The actual layout of the system is a two board design. One board (the "motherboard") contains a 24-line parallel I/O chip for interfacing to the external world, an RS232C serial port with baud rates selectable from 110 to 9600 baud, a hex address and data display, a hex keypad, 14 monitor function keys, 2 user definable keys, a 40-chip wire wrap area with full access to all the bus signals, on-board provision for regulators so that the board can be supplied with standard S-100 voltages, an EPROM programmer which will handle 2708 (1Kx8), 2716 (2Kx8), 2732 (4Kx8) 2532 (4Kx8), 2764 (8Kx8) and the brand new 27128 (16Kx8) EPROMs, a DC-to-DC converter to supply the programming voltage to the EPROM programmer and four (4) slots for IEEE S-100 compatible boards for further expansion. This is an extremely useful and inportant feature as it allows expansion of the system with all boards using this industry-standard bus structure, which are available from MULTIFLEX, as well as from hundreds of manufacturers worldwide.

The other board is the CPU card. This card plugs into one of the S-100 slots on the motherboard and is IEEE 696/S-100 compatible with the full 24-bit address path to allow up to 16 megabytes of memory to be addressed. The processor used is the Z80 (running up to 6 MHz) and there is provision on-board for 64K of dynamic memory (using 4164 chips) which will operate without wait states. Provided for as well is a 2K to 32K (selectable in 2K blocks) common resident area in memory for use with multiple memory banks. There are also 4 sockets on board which will handle 2732 (4Kx8) or 2764 (8Kx8) EPROMs or the new 6116/2016 (2Kx8) static RAMs (all of which can be software deselected if desired) to allow the user complete versatility in setting up the board to meet his own specifications. Also on board is 1 parallel port with 24 lines of I/O and 3 16-bit counter/timers for applications which require the unit to keep track of real time. Another feature of the CPU board is that it was designed by our engineers to run the CP/M 2.2 disk operating system so that if a floppy disk controller board is added to the system a fully configured CP/M machine can be set up for a very low cost as described on page 13.

The monitor software that comes with the kit is a well-written extensive package which allows the user to have complete versatility in machine language programming and execution as well as control of all the features on the board. The monitor functions include: examine/modify memory locations, memory block moves, compare 2 blocks of memory, examine CPU register, examine I/O ports, load and save from cassette calculate relative branch offsets, set breakpoints single step programs, execute programs, and program EPROMs. Each of these process is invoked by a single keypress. Also available to the use are 2 spare keys definable for special functions a required by specific applications and applicator programs.

Available as an option, there is a piggyback board which attaches to the CPU board and give the user a real-time/time-of-day clock with battery back-up, memory management for up-to 16M of memory in 4K blocks, 2 RS232C ports which have independent software selectable baud rates, vectored interrupts for the onboard I/O and clock devices, and a general interrupt controller designed to handle multiple intterupts for up to 7 other boards.

All these features make this a very impressive stand-alone unit and, when combined with the S-100 boards either from the MULTIFLEX line r from most other manufactures, give the user the potential for a very powerful microcomputer system.

The standard kit includes the CPU board with a Z80A (4HMz) processor, 2K of RAM (a 6116), and 4K of EMPROM (a 2732) as well as the motherboard with all the features mentioned above except the RS232C port and the DC-toDC converter. Also supplied are sockets for all IC's and 1 S-100 connector.

Multiflex S-100 Video Board

This board is an intelligent, I/O mapped, 80 x 24 Video Display Board. Based on the 8275 programmable CRT controller, the 8257 programmable DMA controller, and a Z80 processor. Provided on board is 8K of static RAM which gives the user 3½ screens of text. With simple commands, the user can easily scroll around in this buffer, clear the present page and home, home on the present page and go to the beginning of the buffer. There are also 4 field attributes (blink, reverse video, underline, and highlight) which can be turned on and off by software. Other software commands include a carriage return, line feed, clear to end of line; transmit cursor location; transmit character at cursor location; position cursor; disable control functions; reset control register; as well as all the standard functions such as tab return, line feed, and backspace. Also included in the software is a debug/setup program which completely tests the board and allows the user to set up various parameters on it. The output from the board is in either composite video or a video signal with separate horizontal and vertical sync signals (either normal or inverted).

$269.00

Multiflex S-100 Floppy Disk Controller

The MULTIFLEX floppy disk controller is a state-of-the-art IEEE 696/S-100 compatible board. It allows the user to interface, simultaneously, up to four (4) 8 inch or 5¼ inch disk drives in any combination to his system with the flexibility of single/double sided and single/double density operation. If desired, all operations with the optional on-board controller or under processor control. Latest technology has been used in this design. The board is designed around the FD2793 controller chip for easy use under any operating system. However, this board is especially designed for easy use with the CP/M or MP/M operating system (available as an option) and the MULTIFLEX Z80 computer kit. With all these features and its reasonable cost, this board is one of the best buys in a floppy disk controller board on the market today.

$269.00

$100.00

MULTIFLEX 256k RAM CARD

• Provides user with upto 256k of Dynamic RAM. • Uses 4164 150ns. • Refresh of RAM can be handled externally (if Z80 processor is available or internally if no refresh signal is available. • Waitstates can be jumper selected. • Compatible with CP/M and MP/M operating systems. • Bank select feature. • Write protect option.

Complete RAM CARD with 64k of RAM — $249
128k — $319 256k — $439

MULTIFLEX S100 64K STATIC RAM CARD

• Uses 2k x 8 static RAM chips. • Static RAM eliminates problems with refresh. • Optional provision for battery back up provides you with ideal way to store data even when the power is turned off.

Complete board with
4k RAM — $99 32k RAM — $250
16k RAM — $170 64k RAM — $399

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Every Quentin drive has been engineered to provide you with years of reliable service and we stand behind that promise with a one year limited warranty on parts and labor. Your Authorized Quentin dealer will be happy to demonstrate all of the outstanding features of our range of disk storage products, including the cost; but remember "cost isn't our only advantage."

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shows, digitized sound recordings, laser operated optical music discs and interactive optical teaching programs. The intricacies of such considerations are beyond the pervue of this article. Further, there is some thought that particularly useful software programs, such as *Wordstar, VisiCalc,* some educational programs and some authoring languages . . . proprietary ones, that is . . . may have useful lifespans in excess of the ten to twenty years that is currently being considered by the Department. In any event, before the legislation goes to a second reading, it will be referred to Committee where members of the public and industry will have an opportunity to express their opinions.

However, no matter what the Copyright Act says or what the penalties handed down by the courts become, there will always be software pirates. Currently, it costs some five hundred to seven hundred and fifty million dollars in lost revenue to software producers each year. Needless to say, such producers are determined to develop some way that their programs can be protected from illicit copying. As yet, there is no sure way of stopping it. There are all sorts of ideas and systems, and many of them are marketed, but none are totally successful. Anyone who is "into" computers can find a way around them, or if not, there are a number of bypass systems that can do the job all but automatically for the chronically lazy.

Essentially, software protection systems can either be built into the hardware . . . very expensive and not totally secure as yet . . . or placed on the software itself . . . cheap but providing little or no protection.

When computers were dropping from the mainframe to the mini size, the emphasis was on improving and cheapening hardware protection systems. With the advent of micros on a mass scale, concurrent with a veritable torrent of floppy disks to feed them, the emphasis switched to software protection systems with little or no success. The emphasis currently is to switch back to a hardware based protection system for the micros.

There are any number of these on the market,none of them totally secure. All can be cracked or bypassed. But the forces employed by the software manufacturers have sharpened their pencils and lubricated their intellects and "progress" seems to be being made.

One of the more interesting developments is a product put out by the Vault Corporation of Westlake Village, California, and called *Prolock.* Analogous to a lock and key, the system involves a proprietary process in which "fingerprints" are physically imposed as visible dots on the backside of the floppy disks. This "key" must be present before the protected software is able to run. In practice, a software buyer obtains blank disks containing the *Prolock* fingerprints and eight to twenty K of associated software. Then as he or she copies the program onto each unique disk, the *Prolock* software encrypts the program's source code several times, linking the encrypted program to the physical fingerprint.

Before the program can be run it must find its associated hardware key within the computer. It is all user transparent. This system therefore permits the user to make back-up copies of the program on other floppies or hard disks. Pirated copies will not run on another computer without the appropriate decoding contained on a single floppy held by the company. While this system is really only of use for companies who may be held liable for the illicit copying of programs by their employees, it does present a cheap step forward. Further, by copying purchased software onto the *Prolock* disks before placing it in general use by staff the companies can protect sensitive data or expensive systems. Some eight million disks are expected to be sold this year, approximately one percent of all floppies sold in the United States. While not foolproof to the expert in computers, it is felt that ninety percent of all copying is casual . . . and this appears to be a way of slowing it down, if not in fact completely stopping, the casual software piracy of business programs.

The High Seas

The long term advantage to having a protected system, in the industry view, is that the price of a floppy containing a software program would drop dramatically. Currently, such companies charge an enormous premium knowing that their programs are unprotected and will be copied no matter how many warning signs are stuck on the floppy's label cautioning the purchaser not to. If these companies could be reasonably certain that their programs would not be copied, they would charge a more realistic price . . . between 15 and 35 percent of what they currently charge.

As matters *currently* stand in Canada, thou may copy, but thou may not *use* the copy. **CN!**

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Fruit Crate

If there has been a small insane voice inside your skull trying to talk you into setting up a BBS here's your chance to shut it up. The Fruit Crate is the simplest, least expensive way to get on line yet.

by Steve Rimmer

Modems are a sort of place of mind... once you get your head around what it means to use one your cosmic space will be forever changed. Having one isn't as good as studying Zen for twenty years, to be sure, but you can't buy good Zen over the counter any more. Besides, there's all that sitting around and thinking involved in it.

Modems are considerably easier to implement. You can simply plug one into your computer, boot the terminal and talk to the universe. Plug in a fancier terminal and you'll be able to do things like download software and capture text. However, the real spiritual grandure of modem ownership is not in any kind of terminal at all. In fact, it doesn't even involve you directly.

The absolute slice is in setting up and running a bulletin board.

A BBS is a very sophisticated bit of software. It can be as complex or as simple as you feel like having it, deal with whatever part of creation you think needs addressing and can have a personality all its own. The rewarding thing about doing a board is that you get to communicate... or telecommunicate... with a lot of other souls in your space.

The unfortunate thing about BBS software is that half of all that there is in the world is very expensive... and doesn't work well... and the other half, while free, is hard to find... and doesn't work well either. This has dissuaded many computer users from setting up their own systems.

With all of this flowing through the nexi of our 6502s, we set about to assemble the Fruit Crate. Presented here, the Crate is a BBS package for anyone who wants to get on line with minimum of digital sweat. It runs on the common Apple clone, lowly entity that it is,

Program 1

```
100  REM  A SMALL BBS FOR THE APPLE II+
110  REM  FRUIT CRATE VERSION 4.08
120  REM  COPYRIGHT 1984 (C)
130  REM  STEVE RIMMER
140  REM  USES HAYES MICROMODEM
150  HOME : INVERSE
160  VTAB (12): HTAB (10): PRINT
     "WAITING FOR CALLER": NORMAL
170  PRINT  CHR$ (26)
180  REM  *** DEFINES
190 VER$ = "4.08"
200 CR$ =  CHR$ (13) +  CHR$ (10)
210 D$ =  CHR$ (4)
220 DR$ = "1": REM  FILE DRIVE
230 BEL$ =  CHR$ (7)
240 RING =  - 16235
250  PRINT D$;"BLOAD HOOK.OBJ0"
260 BUF = 16384 : REM MESSAGE BUFFER
270  PRINT D$;"IN#1"
280  PRINT D$;"PR#1"
285  POKE RING,0 : REM HANG UP SSM
290  IF  PEEK (RING) > 127 THEN 290
300  PRINT "      RINGING!!!" + CR$
310  POKE RING, PEEK (RING) - 4
320  REM  *** RUNNING CODE
330  FOR X = 1 TO 24: PRINT CR$;: NEXT X
340  CALL 768 : INSTALL DOS HOOKS
350  REM  -LOG ON
360 A$ = "FRUIT CRATE BBS VERSION " +
     VER$ + CR$ + CR$
370  GOSUB 1120
380 A$ = CR$ + "WHAT'S YOUR FIRST NAME?
     ":LT = 20
390  GOSUB 1120: GOSUB 1020
400  IF  LEN (A$) < 3 THEN  GOTO 380
410 PN$ = A$
420 A$ = CR$ + "AND YOUR LAST NAME, " +
     PN$ + "? ":LT = 20
430  GOSUB 1120: GOSUB 1020
440  IF  LEN (A$) < 3 THEN  GOTO 420
450 LN$ = A$
460 A$ = CR$ + "YOUR PASSWORD? ":LT = 5
470  GOSUB 1120: GOSUB 1020
480  IF  LEN (A$) < 3 THEN  GOTO 460
490 PW$ = A$
500 A$ = CR$ + "YOU ARE " + PN$ + " " +
     LN$ + "." + CR$ + "YOUR PASSWORD IS
     " + PW$ + "." + CR$ + "IS THIS
     CORRECT? "
510  GOSUB 1120: GOSUB 1180
520  GOSUB 1150
530  IF A$ = "NO" THEN  GOTO 380
540 ID$ = PN$
550  IF  LEN (ID$) < 20 THEN ID$ = ID$ +
     " ": GOTO 550
560 ID$ = ID$ + LN$
570  IF  LEN (ID$) < 40 THEN ID$ = ID$ +
     " ": GOTO 570
580 ID$ = ID$ + PW$
590  IF  LEN (ID$) < 45 THEN ID$ = ID$ +
     " ": GOTO 590
600 LS$ = A$: PRINT CR$

610  REM  -CHECK OUT CALLER
620 FLG = 0
630  PRINT D$;"OPEN USER LOG,D" + DR$
640  PRINT D$;"READ USER LOG"
650  ONERR  GOTO 1240
660  INPUT A$
670 FLG = 1
680  IF ID$ = A$ THEN  PRINT D$;"CLOSE":
     GOTO 710
690  IF  LEFT$ (ID$,40) =  LEFT$ (A$,40)
     THEN  PRINT D$;"CLOSE":A$ = CR$ +
     "TRY AGAIN" + CR$: GOTO 370
700  GOTO 660
710 A$ = CR$ + CR$ + "YOU'RE NOW LOGGED
     ONTO THE SYSTEM..." + CR$ + CR$
720  GOSUB 1120: POKE 216,0
730  GOSUB 1330
740 A$ = CR$ + "WHAT'LL IT BE?" + CR$ +
     "(E,S,R,K,C,X OR ? FOR MENU) "
750  GOSUB 1120
760  GET A$
770  IF A$ = "E" THEN  GOTO 1510
780  IF A$ = "S" THEN  GOTO 1920
790  IF A$ = "R" THEN  GOTO 2120
800  IF A$ = "K" THEN  GOTO 2310
810  IF A$ = "C" THEN  GOTO 2450
820  IF A$ = "X" THEN  GOTO 2540
830  IF A$ = "?" THEN  GOSUB 1330
840  GOTO 740
850  REM END OF THE MAIN CODE
860  REM  -GET SOFT LINE
870 A = 0
880  GET A$
890  IF A$ =  CHR$ (8) AND A = 0 THEN
     880
900  IF A$ =  CHR$ (13) THEN 960
910  IF A$ =  CHR$ (8) THEN A = A - 1:
     PRINT  CHR$ (8);: GOTO 880
920  POKE 512 + A, ASC (A$)
930  PRINT A$;
940 A = A + 1
950  IF A < LT + 1 THEN 880
960 A$ = ""
970  IF A = 0 THEN 1010
980  FOR X = 512 TO 512 + A
990 A$ = A$ +  CHR$ ( PEEK (X))
1000  NEXT X
1010  RETURN
1020  REM  -GET LINE HARD END
1030 A$ = ""
1040  CALL  - 657
```

Fruit Crate

```
1050 FOR X=512 TO (512 + LT)
1060 A =  PEEK (X): IF A > 128
     THEN A = A - 128
1070 A$ = A$ +  CHR$ (A)
1080  IF  PEEK (X) < 160 THEN
     X = 512 + LT
1090  NEXT X
1100  IF  LEN (A$) > 1 THEN A$
     = LEFT$(A$, LEN (A$) - 1)
1110  RETURN

1120  REM -PRINT STRING IN A$
1130  PRINT A$;
1140  RETURN

1150  REM  -NEW LINE
1160  PRINT
1170  RETURN

1180  REM  -GET HOT Y OR N
1190  GET A$
1200  IF A$="Y" THEN A$="YES":
GOSUB 1120: GOTO 1230
1210  IF A$="N" THEN A$="NO":
GOSUB 1120: GOTO 1230
1220  GOTO 1190
1230  RETURN

1240  REM  -USER LOG ADD
1250  POKE 216,0
1260 PRINT D$;"CLOSE USER LOG"
1270 PRINT D$;"APPEND USER LOG"
1280 PRINT D$;"WRITE USER LOG"
1290  PRINT ID$
1300 PRINT D$;"CLOSE USER LOG"
1310 A$="WELCOME TO THE
SYSTEM." + CR$ : GOSUB 1120
1320  GOTO 710

1330  REM  -SHOW THE MAIN MENU
1340 A$ = CR$ + CR$ + "MAIN
     MENU" + CR$ + CR$
1350 A$=A$ + "S SCAN" + CR$
1360 A$=A$ + "R READ" + CR$
1370 A$=A$ + "E ENTER" + CR$
1380 A$=A$ + "K KILL" + CR$
1390 A$=A$ + "C CHAT" + CR$
1400 A$=A$ + "X LOG OFF" + CR$
1410 A$=A$ + "? MENU" + CR$
1420  GOSUB 1120
1430  RETURN

1440  REM  -ERROR TRAP
     FOR SUMMARY
1450 IF  PEEK(222)=9 THEN
    A$="SORRY... FILE
    ERROR..." +CR$+CR$ :
    GOSUB 1120: GOTO 2540
1460  POKE 216,0
1470 PRINT D$;"WRITE
     SUMMARY,R0"
1480  PRINT 1
1490  PRINT D$;"CLOSE SUMMARY"
1500  GOTO 1800
1510  REM  -ENTER A MESSAGE
1520 A$ = "ENTER" + CR$ + CR$
     + "WHO TO? ": GOSUB 1120
1530 LT=20: GOSUB 1020:DS$=A$:
IF LEN (DS$) < 3 THEN 1910
1540  IF  LEN(DS$) < 20 THEN
DS$=DS$ + " ": GOTO 1540
1550 A$ = CR$ + "ABOUT WHAT?
```


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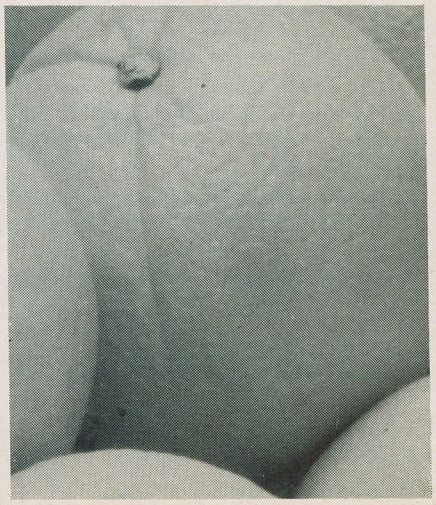
```
    ": GOSUB 1120
1560 LT = 20: GOSUB 1020:SB$ =
     A$: IF SB$ = "" THEN 1560
1570  IF LEN(SB$)< 20 THEN
SB$=SB$ + " ": GOTO 1570
1580 A$ = CR$ + "ONLY HIT
     RETURN TO END A
     PARAGRAPH" + CR$ +
     "EVERYTHING WILL BE
     COOL." + CR$ + CR$
1590  GOSUB 1120
1600 Y = BUF
1610  GET A$: POKE Y, ASC
     (A$):Y = Y + 1
1620  IF A$ =  CHR$ (8) AND
     POS (U) = 0 THEN 1610
1630  IF A$ =  CHR$ (8) THEN
     PRINT CHR$ (8);:Y = Y -
     2: GOTO 1610
1640 IF A$=CHR$(13) THEN PRINT
     CR$
1650  IF A$ = " " AND  POS (U)
     > 33 THEN PRINT CR$;
1660  IF LA$ =  CHR$ (13) AND
     A$ =  CHR$ (13) THEN 1700
1670 LA$ = A$
1680  PRINT A$;
1690  IF Y<BUF+1024 THEN 1610

1700  REM  -ENTER SUB MENU
1710 A$ = CR$ + CR$ + "(S)AVE,
     (C)ONTINUE OR (A)BORT" +
     CR$ + "WHAT'LL IT BE? "
1720  GOSUB 1120
1730  GET A$
1740  IF A$ = "C" THEN A$ =
     "CONTINUE" + CR$: GOSUB
     1120: GOTO 1610
1750 IF A$="A" THEN A$ =
"ABORT": GOSUB 1120: GOTO 1910
1760  IF A$<>"C" AND A$<>"A"
AND A$<>"S" THEN 1710
1770 A$ = "SAVE": GOSUB 1120
1780  ONERR  GOTO 1440
1790  PRINT
1800  PRINT D$;"OPEN
     SUMMARY,L128,D" + DR$
1810  PRINT D$;"READ
     SUMMARY,R0"
1820  INPUT MN
1830  PRINT D$;"WRITE
     SUMMARY,R";MN
1840  PRINT PN$: PRINT LN$:
     PRINT DS$: PRINT SB$:
     PRINT Y
```



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Fruit Crate

```
     PRINT SB$: PRINT Y
1850  PRINT D$;"WRITE SUMMARY,R0"
1860 MN = MN + 1: IF MN > 99 THEN MN = 1
1870  PRINT MN
1880  PRINT D$;"CLOSE SUMMARY"
1890  POKE 216,0
1900  PRINT D$;"BSAVE MESSAGE ";MN -
     1;",A";BUF;",L"Y - BUF;",D" + DR$
1910  GOTO 740


1920  REM  -SCAN
1930 A$ = "SCAN" + CR$ + CR$ + "START?
     ": GOSUB 1120:LT = 2
1940  GOSUB 1020:MN =  VAL (A$): IF MN <
     1 OR MN > 99 THEN 2070
1950  ONERR  GOTO 2070
1960  PRINT D$;"OPEN SUMMARY,L128,D" +
     DR$
1970  PRINT
1980  PRINT D$;"READ SUMMARY,R";MN
1990  INPUT PX$,LX$,DS$,SB$,DD
2000  IF DD = 0 THEN 2060
2010 A$ = CR$ + "MESSAGE " +  STR$ (MN)
     + CR$
2020 A$ = A$ + "FROM: " + PX$ + " " +
     LX$ + CR$
2030 A$ = A$ + "TO: " + DS$ + CR$
2040 A$ = A$ + "ABOUT: " + SB$ + CR$ +
     CR$
2050  GOSUB 1120
2060 MN = MN + 1: GOTO 1970
2070 A$ = CR$ + CR$ + "THAT'S ALL..." +
     CR$: GOSUB 1120
2080  PRINT
2090  PRINT D$;"CLOSE SUMMARY"
2100  POKE 216,0
2110  GOTO 740

2120  REM  -READ A MESSAGE
2130 A$ = "READ" + CR$ + CR$ + "MESSAGE:
     ": GOSUB 1120
2140 LT = 2: GOSUB 1020:MN =  VAL (A$):
     IF MN < 1 OR MN > 99 THEN 2260
2150  ONERR  GOTO 2260
2160  PRINT D$;"OPEN SUMMARY,L128,D" +
     DR$
2170  PRINT D$;"READ SUMMARY,R";MN
2180  INPUT PX$,LX$,DS$,SB$,DD: IF DD =
     0 THEN 2260
2190  PRINT D$;"BLOAD MESSAGE ";MN;",D"
     + DR$
2200 A$ = CR$ + "FROM: " + PX$ + " " +
     LX$ + CR$ + "ABOUT: " + SB$ + CR$ +
     CR$: GOSUB 1120
2210  FOR X = BUF TO DD - 1
2220  PRINT  CHR$ ( PEEK (X));
2230  IF  PEEK (X) = 13 THEN  PRINT
     CHR$ (10);
2240  IF  PEEK (X) = 32 AND  POS (U) >
     30 THEN  PRINT CR$;
2250  NEXT X
2260 A$ = CR$ + "THAT'S IT..." + CR$:
     GOSUB 1120
2270  PRINT
2280  PRINT D$;"CLOSE SUMMARY"
2290  POKE 216,0
2300  GOTO 740

2310  REM  -KILL MESSAGES
2320 A$ = "KILL" + CR$ + CR$ + "MESSAGE?
     ": GOSUB 1120
2330 LT = 2: GOSUB 1020:MN =  VAL (A$):
     IF MN < 1 OR MN > 99 THEN 2400
2340  ONERR  GOTO 2400
2350  PRINT D$;"OPEN SUMMARY,L128,D" +
     DR$
2360  PRINT D$;"READ SUMMARY,R";MN
2370  INPUT PX$,LX$,DS$,SB$,DD
2380  PRINT D$;"WRITE SUMMARY,R";MN
2390  PRINT PX$: PRINT LX$: PRINT DS$:
     PRINT SB$: PRINT 0
2400 A$ = CR$ + "THAT'S IT..." + CR$:
     GOSUB 1120
2410  PRINT
2420  PRINT D$;"CLOSE SUMMARY"
2430  POKE 216,0
2440  GOTO 740

2450  REM  -CHAT
2460 A$ = "CHAT" + CR$ + CR$ + "PAGING A
     HUMAN..." + CR$ + "HIT A FEW
     RETURNS TO LEAVE." + CR$: GOSUB
     1120
2470  FOR X = 1 TO 5: PRINT BEL$;: NEXT
     X
2480  GET A$: PRINT A$;: IF A$ = " " AND
     POS (U) > 33 THEN  PRINT CR$;
2490  IF LA$ =  CHR$ (13) AND A$ =  CHR$
     (13) THEN 2520
2500 LA$ = A$
2510  GOTO 2480
2520 A$ = CR$ + "LEAVING CHAT MODE..." +
     CR$ + CR$: GOSUB 1120
2530  GOTO 740

2540  REM  -LOG OFF
2550 A$ = "LOG OFF" + CR$ + CR$ +
     "PLEASE HANG IT UP NOW!!!" + CR$:
     GOSUB 1120
2560  PRINT  CHR$ (26)
2570  PRINT D$;"PR#0"
2580  PRINT D$;"IN#0"
2590  RUN
```

If only Charlie had a choice.

At first glance, this machine may bear a certain resemblance to its mentor. That's before you turn it on.

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Fruit Crate

Program 2

```
100  REM  BASIC LOADER FOR
110  REM  FRUIT CRATE MACHINE
120  REM  LANGUAGE DRIVER
130  REM  COPYRIGHT 1984 (C)
140  REM  STEVE RIMMER
150  DATA  234, 169, 76, 141, 224, 158
160  DATA  173, 112, 3, 141, 225, 158
170  DATA  173, 113, 3, 141, 226, 158
180  DATA  169, 76, 141, 186, 158, 173
190  DATA  114, 3, 141, 187, 158, 173
200  DATA  115, 3, 141, 188, 158, 96
210  DATA  234, 162, 3, 189, 83, 170
220  DATA  149, 54, 202, 16, 248, 173
230  DATA  150, 192, 41, 4, 201, 4
240  DATA  208, 3, 76, 166, 250, 96
250  DATA  234, 173, 150, 192, 41, 4
260  DATA  201, 4, 208, 3, 76, 166
270  DATA  250, 230, 78, 208, 21, 230
280  DATA  79, 173, 150, 192, 41, 1
290  DATA  201, 1, 208, 10, 173, 151
300  DATA  192, 105, 127, 145, 40, 76
310  DATA  111, 3, 44, 0, 192, 16, 213
320  DATA  145, 40, 173, 0, 192, 44
330  DATA  16, 192, 96, 36, 3, 60, 3
340  DATA  5, 6, 254, 254, 255, 254
350  DATA  254
360  FOR X = 768 TO 890
370  READ A: POKE X,A
380  NEXT X
390  PRINT  CHR$ (4);"BSAVE HOOK.OBJ0,
     A$300, L$80"
```

with either a Hayes Micromodem II or an SSM card. It requires no other hardware and no freaky software save for what's already in your computer. For the most part, it runs in Applesoft.

Drive That Thing

If you understand what a BBS has to do, figuring out what this package is up to will be a lot easier. In essence, a board must listen for a caller and, when one comes by, answer the phone and run a program. The program is the thing that logs you on, eyes your password and handles the messages. However, while it's about this it must also be vigilant about checking for carrier. If the caller hangs up unexpectedly it must be able to reset itself and make things ready for a new caller.

Now, none of these things are conceptually very difficult. What does get a bit tricky is the possibility of having the caller snuff it at virtually any point in the running of the board. In other words, things could cease to be while the system is printing a message, updating a file or waiting for input. Obviously, for example, if you do an INPUT and the party on the line takes off, your board is going to be sitting looking for somebody to talk to it for a long time.

There are a number of ways around this. The one which we've taken here... arguably the best, and certainly the easiest, is to modify the operating system of the computer slightly to install what is called a *host*. In the simplest sense, this is a collection of hooks which will make the remote caller's keyboard act like it's your own.

If you think about this it's fairly easy. When you tell your fruit to GET A$ what it actually does is look at the keyboard port location... $C000... and wait for some life. This is, in fact, a loop. It will keep looping until the value in this location gets above $80, indicating that a key has been hit.

This loop can be modified. You could have it look at the keyboard and, if there's nothing waiting for it there go up and check out the modem status location. If there's nothing there it's back to the keyboard, and then to the modem... until, breathless, it comes up with a legal code.

If we include a carrier status check in this loop the system becomes unhangable. So long as there's a caller the computer will loop and wait for input. If the caller hangs up and the carrier goes into the Twilight Zone the system can break out of the loop and take appropriate action.

The little machine language routine shown here... the HOOK... goes into DOS and installs the routines to make the board look for carrier and do the parallel I/O we've been speaking of. All you have to do is to BLOAD it and CALL 768... where it lives. It will get it's act together, install itself in DOS and... if you make it active when there's no one on line... restart your system.

Up On Line

Getting the Fruit Crate together involves rather a lot of typing, but very little else. To begin with, you'll have to enter the code in programs one and two.

The Crate consists of the large Applesoft program that does most of the work and the small host driver called HOOK.OBJ0.

One important thing about this system is that it likes to reset itself if it's in any way disturbed. As such, having entered it SAVE it real quick... before you run it. SAVE the main board program as whatever you've initialized your disk to see as the startup file... probably HELLO.

Next, run program two. This will generate the HOOK binary file that will be inhaled by your program.

Finally, install your Micromodem or SSM card in your Apple and reboot things. The board is designed to have the modem in slot one rather than two, as some users will have other serial devices living in two. You can change this if you want to by adding sixteen to the slot dependent addresses in the program for each slot you want to move up by. This would also entail changing the source code for the HOOK and reassembling it.

The Works

The Fruit Crate, despite its length, is a very simple BBS. It provides all of the plain vanilla board functions... however, written in Applesoft it's extremely easy to alter when you want it to do more.

The log on procedure gets the caller's name and password. If the caller is new it adds this stuff to the USERS file. If the caller has been on the system before it makes sure that the name and password match or it gets annoyed and repeats the log on procedure.

The message function involves a fairly unusual file structure. If you enter a message into the system it will be stored in high resolution page two and then BSAVE'd. The statistics about the message... who it's from and going to, how long it is and so on... are placed in the SUMMARY file, a random record structure.

Getting a message back entails BLOADing it. This has the advantage of being extremely fast. It litters up the disk with a lot of files, but this is really not much of a problem as they're all small. DOS uses relatively little file space overhead.

One other unusual feature of the system is in the host driver... It'll let you see the control characters on your local screen. They don't show up on the caller's tube. Thus, ends of lines are terminated by "M", backspace is "H", and so on. This is quite useful, as it allows you to see what your callers are trying to do.

Log Off

The Fruit Crate is a good way to meddle with telecommunications... without buying a lot of expensive software or getting bytes stuck under your fingernails trying to hack bizarre code. It's easy to get on line and easier still to modify as you develop your system.

Naturally, a bulletin board will change your head a little. It will turn you into a SYSOP... complete with long dripping fangs and a predeliction for getting hairy when the moon is full. You'll have to adjudicate in the life and death struggles of messages. Your existance will be given over to the service of humanity... no, make that your phone line will be given over to the service of humanity.

It's a really interesting application for your computer... if you can keep your fingers from getting violent when some fool wants to CHAT at four thirty in the morning.

The source code for the hook has been left out because of space considerations and because most people don't want to look at these things. It's not a secret, though. Send us a self stamped and addressed envelope and it's yours. CN!

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BASIC

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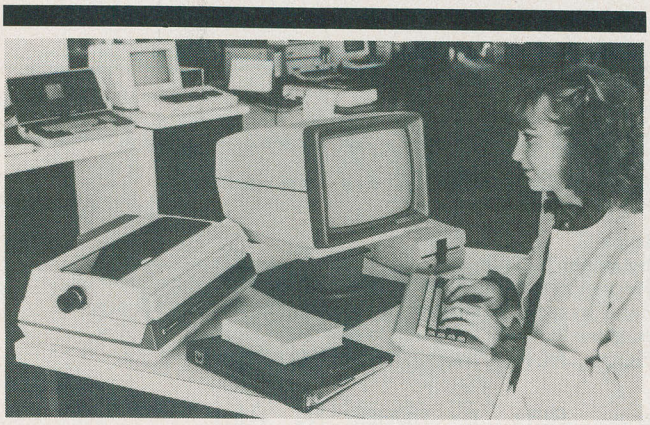
List! Special



Every now and then, inspiration hits. After you dress the resulting wound, you sit down at your computer to write, revise and debug until your fingers bleed. The result of all this bloodshed, however, is a program that you can call your own.

The main purpose of our normal monthly List feature is to give readers a bit of typing exercise to complement a free program. Unfortunately, space constraints usually mean that only one or two listings get in each issue. This means that there's little variety, and we stockpile a large number of programs.

This is the CN! List Special, a selection of short programs written by owners of varied computers. Most of the listings can be fairly easily converted for other computers, so don't be put off if you don't see your machine listed on the next few pages. Few violent POKES or PEEKS have been implemented.

Computing Now! pays authors for their original short listings. If interested in the resulting fame and fortune, send your programs to List, in care of this magazine.

Hasten to your keyboard, gentle reader. The listings await.

Craps
by Chris Buffett

A game of chance for the TRS-80 Color 2 computer. Be warned ... this program enjoys winning.

```
10 'C R A P S
20 'BY  CHRIS BUFFETT
30 'JAN 11/84
35 'FOR TRS-80 COLOR 2 (4,16,32 OR 64 K)
36 'EXTENDED BASIC NOT REQUIRED
40 CLS 3
50 PRINT@10,"C R A P S";
60 PRINT@64,"ROLL A 7 OR 11 ON 1ST ROLL"
70 PRINT@96,"AND WIN"
80 PRINT@128,"ROLL A 2,3 OR 12 AND LOSE"
90 PRINT@160,"ROLL A 4,5,6,8,9 OR 10 AND"
100 PRINT@192,"KEEP ROLLING UNTIL YOU MATCH IT"
110 PRINT@224,"AND WIN, OR ROLL A 7 AND LOSE."
120 PRINT@ 420,"HIT ANY KEY TO START";
130 A$=INKEY$:IF A$=""THEN 130
140 CLS
150 INPUT"SCORE NEEDED TO WIN";A
160 L=A
170 INPUT"AMOUNT TO START WITH";R
180 Z=R
190 FOR G=1 TO 1000:NEXT
200 CLS 0
210 PRINT"YOU NOW HAVE $"Z:PRINT"YOU HAVE TO GET $"L:INPUT"YOUR BET";B
220 U=0
230 IF B>Z THEN PRINT"YOU DON'T HAVE THAT MUCH":GOTO 210
240 CLS
250 C=RND(6):D=RND(6)
260 Q=C+D
270 GOSUB 370
280 IF Q=7 OR Q=11 THEN Z=Z+B:GOSUB 730:GOSUB 370:GOTO 190
290 IF Q=2 OR Q=3 OR Q=12 THEN GOSUB 680:GOSUB 370:GOTO 190
300 PRINT@448,"HIT <SPACEBAR> TO CONTINUE"
310 R$=INKEY$:IF R$<>CHR$(32)THEN 310
320 X=RND(6):Y=RND(6)
330 U=X+Y
340 IF U=Q THEN Z=Z+B:GOSUB 730:GOSUB 370:GOTO 190
350 IF U=7 THEN Z=Z-B:GOSUB 680:GOSUB 370:GOTO 190
360 GOSUB 370:GOTO 300
370 FOR F=0 TO 384 STEP 32
380 GOSUB 780:NEXT F
390 FOR F=0 TO 24
400 GOSUB 780:NEXT F
410 FOR F=24 TO 408 STEP 32
420 GOSUB 780:NEXT F
430 FOR F=384 TO 408
440 GOSUB 780:NEXT F
450 FOR F=64 TO 88
460 GOSUB 780:NEXT F
470 FOR F=128 TO 152
480 GOSUB 780:NEXT F
490 FOR F=192 TO 216
500 GOSUB 780:NEXT F
510 FOR F=256 TO 280
520 GOSUB 780:NEXT F
530 FOR F=320 TO 344
540 GOSUB 780:NEXT F
550 PRINT@36," C R A P S";
560 PRINT@97,"SCORE NEEDED = $";A+R;
570 PRINT@161,"YOU BEGAN WITH $";R;
580 PRINT@225,"YOU NOW HAVE   $";Z-B;
590 PRINT@289,"YOUR 1ST ROLL  =";Q;
600 PRINT@353,"YOUR LAST ROLL =";U;
610 PRINT@25,"YOUR";
620 PRINT@57,"BET=";
630 PRINT@89,B;
640 IF Z>=R+A AND P=1 OR Z<=0 AND P=1 THEN RETURN
650 IF Z>=R+A THEN 800
660 IF Z<=0 THEN 930
670 RETURN
680 CLS 8
690 PRINT@232,"YOU LOSE";
700 SOUND RND(200),10
710 L=L+B
720 RETURN
730 CLS 7
740 PRINT@232,"YOU WIN";
750 SOUND RND(200),10
760 L=L-B
770 RETURN
780 PRINT@F,CHR$(143+48)
790 RETURN
800 FOR T=1 TO 1000:NEXT
810 CLS 8
820 FOR S=1 TO 25
830 CLS RND(9)-1
840 SOUND RND(200),1
850 NEXT S
860 PRINT@228,"YOU WON THE GAME";
870 PRINT@256,"HIT ANY KEY FOR YOUR LAST ROLL"
880 IF INKEY$=""THEN 880
890 P=1
900 GOSUB 370
910 PRINT@456,""
920 END
930 FOR T=1 TO 1000:NEXT
940 CLS 8
950 FOR S=1 TO 25
960 CLS RND(9)-1
970 SOUND RND(200),1
980 NEXT S
990 PRINT@228,"HA HA!! YOU LOST";
1000 PRINT@256,"HIT ANY KEY FOR YOUR LAST ROLL"
1010 IF INKEY$=""THEN 1010
1020 P=1
1030 GOSUB 370
1040 PRINT@448,""
1050 END
```

Bargraphs
by Brian Dobbs

Written for the Commodore 64, this program will display your data for all to see in graphic form.

```
1 POKE53280,0:POKE53281,0
2 REM ***** BARGRAPHS ON THE C-64 *****
4 REM **** WRITTEN BY BRIAN DOBBS *****
6 REM *****    TIMMINS, ONTARIO   *****
10 PRINT"■":PRINT"■WHAT'S THE NAME OF THE CHART":INPUTA$
20 PRINT"WHAT IS THE MAXIMUM PRICE FOR "A$:INPUTB
30 PRINT"HOW MANY ENTRIES ARE THERE?(UP TO 30)"
40 INPUTN
50 DIMD(N)
60 FORI=1TON
65 PRINT"ENTRY NO.";I;"=";
70 INPUTD(I)
75 IFD(I)>BTHEN85
80 NEXTI
82 GOTO100
85 PRINT"YOU'RE OVER THE SCALE, TRY AGAIN":GOTO65
100 PRINT"■":PRINTTAB(20-(LEN(A$)/2))A$
113 PRINT"■■"
115 PRINTB:LETZ=0
130 LETZ=Z+(B/20)
135 IFZ=BTHEN160
140 PRINTINT(B-Z):GOTO130
160 R=1992:S=1:T=56264:U=2
600 FORE=RTOR-(40*((D(S)/(B/20))))STEP-40:POKEE,224:NEXT
700 FORF=TTOT-(40*((D(S)/(B/20))))STEP-40:POKEF,U:NEXT
710 R=R+1:S=S+1:T=T+1:U=U+1
715 IFU=8THENU=2
720 IFS=N+1THEN800
730 GOTO600
800 GETA$:IFA$=""THEN800
810 PRINT"■":PRINT"WANT TO DO ANOTHER GRAPH?(Y/N)":INPUTP$
820 IFP$="Y"THENGOTO10
830 END
```

List! Special

Gemini Download Facility
by Yin Pun

This utility edits and downloads user-defined characters to either the Gemini 10X or Gemini 15X. The program is written in Applesoft. Be sure switch two on the printer is 'on'.

```
10  REM GEMINI DOWNLOAD FACILITY BY YIN PUN
20  REM Copyright February 1984
30 D$ =  CHR$ (4)
40  HOME
50  PRINT "User defined character editor and"
60  PRINT "downloader to Gemini 10X/15X printer"
70  PRINT : PRINT "By Yin H. Pun": PRINT "Copyright February 1984"
80  PRINT : PRINT "1 - DOWNLOAD CHARACTER SET TO PRINTER"
90  PRINT "2 - EDIT CHARACTER"
100  PRINT "3 - LOAD CHARACTER SET FROM DISK"
110  PRINT "4 - SAVE CHARACTER SET"
120  PRINT "A - AUTODOWNLOAD"
130  PRINT "C - CLEAR CHARACTER SET"
140  PRINT "Q - QUIT"
150  PRINT : PRINT "PLEASE SELECT ONE? ";
160  GET A$
170  PRINT A$;
180  IF A$ = "1" THEN 260
190  IF A$ = "2" THEN 1000
200  IF A$ = "3" THEN  PRINT D$: PRINT D$"BLOAD DOWNLOAD SET"
210  IF A$ = "4" THEN  PRINT D$: PRINT D$"BSAVE DOWNLOAD SET,A$4000,L$1000"
220  IF A$ = "A" THEN  PRINT D$: PRINT D$"BLOAD DOWNLOAD SET":S = 1: GOTO 260
230  IF A$ = "C" THEN  PRINT : PRINT "CLEAR CHARACTER SET? ";: GET A$: IF A$ = "
Y" THEN  HGR2 : TEXT
240  IF A$ = "Q" THEN  END
250  GOTO 40
260  REM DOWNLOAD CHARACTERS TO PRINTER
270  HOME : PRINT "DOWNLOADING CHARACTERS... PLEASE WAIT": PRINT "THE 'GARBAGE'
BEING PRINTED IS NORMAL."
280  PRINT "SOME CARRIAGE RETURN'S WILL BE EXECUTED."
290  PRINT D$
300  PRINT D$;"PR#1"
310  PRINT  CHR$ (9)"0";: REM Put printer interface in transparent mode
320  PRINT  CHR$ (27);"@";: REM Reset Printer
330  PRINT  CHR$ (27); CHR$ (42); CHR$ (0);: REM COPY CHARACTER ROM INTO CHARACT
ER RAM
340 A = 8192 * 2: REM CHARACTER TABLE IS AT $4000
350  PRINT
360  FOR C = 32 TO 126
370  IF C = 65 OR C = 95 THEN  PRINT " "
380  PRINT  CHR$ (27); CHR$ (42); CHR$ (1); CHR$ (C);
390  IF  PEEK (A + 10) = 1 THEN  PRINT  CHR$ (1);: REM CHECK FOR DESCENDER
400  IF  PEEK (A + 10) <  > 1 THEN  PRINT  CHR$ (0);
410  FOR L = 1 TO 9
420  PRINT  CHR$ ( PEEK (A));
430 A = A + 1
440  NEXT L
450 A = A + 7
460  NEXT C
470  PRINT  CHR$ (27);"@"
480  PRINT  CHR$ (27); CHR$ (36); CHR$ (1);: REM SELECT DOWNLOAD CHARACTER
490  IF S = 1 THEN  HOME : PRINT D$: PRINT D$"PR#0": PRINT "THE CHARACTERS ARE D
OWNLOADED AND": PRINT "SELECTED.  THEY WILL REMAIN IN THE": PRINT "PRINTER UNTIL
 POWER-OFF.": END
500  FOR C = 32 TO 126
510  PRINT  CHR$ (C);
520  NEXT C
530  PRINT  CHR$ (27);"F"
540  PRINT D$;"PR#0"
550  RUN
1000  REM Edit Printer Characters
1010  HOME
1020  PRINT "EDIT CHARACTER --"
1030  INPUT "ENTER CHARACTER OR ASCII NUMBER? ";A$
1040  IF  LEN (A$) > 1 THEN CH =  VAL (A$)
1050  IF  LEN (A$) = 1 THEN CH =  ASC (A$)
1060  IF  LEN (A$) = 0 THEN  RUN
1070  INPUT "IS IT A DESCENDER? ";A$
1080 A = 8192 * 2 + (CH - 32) * 16
1090  POKE A + 10,0
1100  IF A$ = "Y" THEN  POKE A + 10,1
1110  PRINT CH
1120  REM SET UP MATRIX
1130  HOME
1140  DIM A(9,7)
1150  PRINT "  123456789   ";: PRINT "THE CHARACTER IS "; CHR$ (CH)
1160  PRINT "1": PRINT "2": PRINT "3": PRINT "4": PRINT "5": PRINT "6": PRINT "7
"
1170  PRINT : PRINT "I,J,K,M TO MOVE CURSOR; '/' TO SET BIT": PRINT "'.' TO ERAS
E BIT"
1180  PRINT "PRESS 'ESC' WHEN DONE."
1190  REM GET CHARACTER FROM RAM
1200 S = A: REM SAVE A
1210  FOR X = 1 TO 9
1220 P =  PEEK (A)
1230  FOR Y = 1 TO 7
1240 P = P / 2
1250  IF P =  INT (P) THEN A(X,Y) = 0: HTAB X + 1: VTAB Y + 1: PRINT " ";
1260  IF P <  >  INT (P) THEN A(X,Y) = 1: HTAB X + 1: VTAB Y + 1: PRINT  CHR$ (2
55);
1270 P =  INT (P)
1280  NEXT Y
1290 A = A + 1
1300  NEXT X
1310 A = S
1320 X = 1:Y = 1
1330  REM EDIT CHARACTER
1340  VTAB 2: HTAB 2
1350  GET A$: IF A$ = "/" THEN  HTAB X + 1: VTAB Y + 1: PRINT  CHR$ (255);:A(X,Y
) = 1
1360  IF A$ = "." THEN  HTAB X + 1: VTAB Y + 1: PRINT  CHR$ (32);:A(X,Y) = 0
1370  IF A$ = "I" THEN Y = Y - 1: IF Y < 1 THEN Y = 7
1380  IF A$ = "M" THEN Y = Y + 1: IF Y > 7 THEN Y = 1
1390  IF A$ = "J" THEN X = X - 1: IF X < 1 THEN X = 9
1400  IF A$ = "K" THEN X = X + 1: IF X > 9 THEN X = 1
1410  IF A$ =  CHR$ (27) THEN 1440
1420  HTAB X + 1: VTAB Y + 1: PRINT  CHR$ (0);
1430  GOTO 1350
1440  VTAB 13: PRINT : FOR V = 1 TO 7
1450  FOR U = 1 TO 9
1460  PRINT A(U,V);
1470  NEXT U
1480  PRINT
1490  NEXT V
1500  REM POKE DATA INTO RAM
1510 SUM = 0
1520  FOR U = 1 TO 9
1530  FOR V = 1 TO 7
1540 SUM = SUM + ((2 * A(U,V)) ^ V) / 2
1550  NEXT V
1560  POKE A,SUM
1570 A = A + 1
1580 SUM = 0
1590  NEXT U
1600  PRINT "PRESS 'ESC' TO GET TO MENU, ANY OTHER": PRINT "KEY TO EDIT ANOTHER
CHARACTER."
1610  GET A$
1620  IF A$ <  >  CHR$ (27) THEN  CLEAR : GOTO 1000
1630  RUN
```

Lotto
by Roger N. Tulk

Programmers get incredibly creative when drooling over four million dollar jackpots. Written for the Apple][, this program will generate numbers for either Lotto 649 or Lottario.

```
500   REM   PROGRAM "LOTTO"

600   REM   BY ROGER N. TULK
700   REM
800   REM       THIS PROGRAM SELECTS
       SIX RANDOM NUMBERS FOR USE
       IN EITHER THE LOTTO 649 OR
       LOTTARIO LOTTERIES.
900   REM
1000   HOME
1100   PRINT "TURN ON PRINTER!!": FOR
      PAUSE = 1 TO 3000: NEXT PAUS
      E
1200   PRINT "LOTTO 649(A) OR LOTT
      ARIO(B)?": GET A$: PR# 1
1300   PRINT
1400   PRINT "YOUR LUCKY NUMBERS A
      RE:";
1500   IF A$ = "A" THEN X = 50
1600   IF A$ = "B" THEN X = 40
1700   IF A$ <   > "A" THEN 1900
1800   GOTO 2000
1900   IF A$ <   > "B" THEN 1200
2000   FOR N = 1 TO 6
2100 A =   INT ( RND (1) * X)
2200 A(N) = A
2300   FOR Z = 0 TO N - 1
2400   IF A(N) = A(Z) THEN 2100
2500   NEXT Z
2600   NEXT N
2700   GOSUB 3300
2800   PRINT B(1);", ";B(2);", ";B
      (3);", ";B(4);", ";B(5);", "
      ;B(6)
2900   PR# 0
3000   PRINT "ANOTHER SERIES?": GET
      G$
3100   IF G$ = "Y" THEN 1200
3200   END
3300   FOR Z = 1 TO 6
3400   FOR Y = 2 TO 50
3500   FOR N = 1 TO 6
3600   IF A(N) < Y THEN B(Z) = A(N
      ):A(N) = 60: NEXT Z: RETURN

3700   NEXT N: NEXT Y
```

Similarity Comparator
by Frederic Dahm

When used as a subroutine, this Applesoft program is useful when comparing bold input to acceptable strings. By itself, it's fun to play with.

```
0  REM  SIMILARITY COMPARATOR
1  REM  BY: FREDERIC DAHM
2  REM       314 HICKSON
3  REM       ST-LAMBERT
4  REM       J4R-2P1
5  REM  DATE: JANUARY 31ST '84
10  HOME
20  PRINT  TAB( 5);"-=*( SIMILARI
    TY COMPARATOR )*=-"
30  PRINT : PRINT : PRINT
35  PRINT "----------------------
    ------------------"
40  PRINT "THIS PROGRAM IS TO HEL
    P YOU COMPARE TWO"
50  PRINT : PRINT "STRINGS AND DE
    TERMINE THE PERCENTAGE OF"
60  PRINT : PRINT "SIMILARITY. IT
     CAN BE ALSO MERGED WITH"
70  PRINT : PRINT "ÀNOTHER PROGRA
    M TO HELP FIND THOSE"
80  PRINT : PRINT "STRINGS THAT A
    RE 'ALMOST' THE SAME"
90  PRINT : PRINT "BUT AREN'T, BE
    CAUSE OF A SYNTAX ERROR"
100  PRINT : PRINT "BY THE PROGRA
    MMER."
105  PRINT "----------------------
    ----------------------"
110  PRINT : PRINT
120 T = 0:P = 3
130  INPUT "FIRST WORD :";A$
140 A =  LEN (A$)
150  INPUT "SECOND WORD:";B$
160 B =  LEN (B$)
170  IF A$ = B$ THEN  PRINT "***
    PERFECT MATCH ***":S = 100: GOTO
    400
180  IF A > B THEN B = A
190  FOR M = 1 TO B
200 C = 0
210  FOR I = 1 TO M
220 K$ =  MID$ (A$,B - M + I,1)
230 L$ =  MID$ (B$,I,1)
240  IF K$ = L$ THEN C = C + 1
250  NEXT I
260 C = C ^ P
270 T = T + C
280  NEXT M
290  FOR M = B + 1 TO 2 * B - 1
300 C = 0
310  FOR I = 1 TO 2 * B - M
320 K$ =  MID$ (A$,I,1)
330 L$ =  MID$ (B$,M - B + I,1)
340  IF K$ = L$ THEN C = C + 1
350  NEXT I
360 C = C ^ P
370 T = T + C
380  NEXT M
390 S = 100 * T / B ^ P
400  PRINT S;"% OF SIMILARITY"
410 T = 0
415  PRINT : PRINT
420  INPUT "ENTER ANOTHER WORD (Y
    /N):";R$
425  IF R$ = "N" OR R$ = "NO" THEN
    450
430  INPUT "YOUR OTHER WORD:";B$
440  GOTO 160
450  HOME
460  END
```

Calendar
by George Laporte

Calendars are perpetual, and this one is no exception. Apparently written for the TRS-80, the author swears it is easily transportable to most micros. It will display a calendar of any month between the years 1586 A.D. and 4586 A.D.

```
10 CLS:D=1
20 INPUT"MONTH REQUIRED";M
30 INPUT " YEAR REQUIRED";Y
40 IF M<3 THEN F=365*Y+D+31*(M-1)+INT((Y-1)/4)-INT(.75*(INT((
   (Y-1)/100)+1))):GOT O 60
50 F=365*Y+D+31*(M-1)-INT((.4*M)+2.3)+INT(Y/4)-INT(.75*(INT(Y/100)+1))
60 A=F-(INT(F/7)*7)-1:IF A=-1 THEN A=6
70  PRINT : PRINT
80 RESTORE:FOR N=1 TO 12:READ L
90 IF N=M THEN L1=L
100 NEXT N
110 IF M<>2 THEN 140
120 IF Y/100=INT(Y/100) THEN IF Y/400=INT(Y/400) THEN L1=29 ELSE 140
130 IF Y/4=INT(Y/4) THEN L1=29
140 FOR N=1 TO M:READ M$:NEXT N
150  PRINT " --------------------"
160  PRINT TAB(2);M$;TAB(17);Y
170  PRINT : PRINT " SU MO TU WE TH FR SA": PRINT
180 FOR X=1 TO L1
190  PRINT TAB(A*3+2);: PRINT USING "##";X;
200 A=A+1:IF A=7 THEN A=0: PRINT
210 NEXT X: PRINT: PRINT" --------------------"
220 A$=INKEY$:IF A$="" THEN 220
230 IF A$="+" THEN M=M+1:IF M>12 THEN M=1:Y=Y+1:GOTO 40 ELSE GOTO 40
240 IF A$="-" THEN M=M-1:IF M<1 THEN M=12:Y=Y-1:GOTO 40 ELSE GOTO 40
250 IF A$="Y" THEN RUN ELSE 220
260 DATA 31,28,31,30,31,30,31,31,30,31,30,31
270 DATA JANUARY,FEBRUARY,MARCH,APRIL,MAY,JUNE,JULY,AUGUST,
    SEPTEMBER,OCTOBER,NOVEMBER,DECEMBER
```

Quick Sort
by G.B. Lloyd

Just the thing when it comes time to sort the laundry on wash day. This program is written in Microsoft BASIC for the IBM PC.

```
100 REM Quick sort FEB 24 84 G.B. LLOYD
110 REM Adapted from CN June 83 Issue
120 N=100: DIM SS$(N):DIM LO%(50):DIM HI%(50):MAX=N
130 FOR I%= 1 TO N
140     N1=INT (RND(1)*5+1):A$=""
150      FOR J%=1 TO N1
160        B$=CHR$(INT (RND(1)*26+65))
170        A$=A$+B$
180      NEXT J%
190     SS$(I%)=A$
200 NEXT I%
210 T1$=TIME$:PRINT"sorting..":GOSUB 4000:T2$=TIME$
220 FOR I%=1 TO N:PRINT I%;" ";SS$(I%):NEXT I%
230 PRINT T2$:PRINT T1$:PRINT "sort finished ";N;" elements"
240 END
4000 REM ** quicksort ASCENDING
4010 LO%(1)=1:HI%(1)=MAX:II%=1
4020 IF II%<1 THEN RETURN
4030 IF LO%(II%)=>HI%(II%) THEN II%=II%-1:GOTO 4020
4040 I%=LO%(II%)-1:J%=HI%(II%):IL%=J%
4050 IF I%=>J% THEN 4100
4060 I%=I%+1:IF SS$(I%)<SS$(IL%) THEN 4060
4070 J%=J%-1:IF J%>I% AND SS$(J%)>SS$(IL%) THEN 4070
4080 IF I%<J% THEN SWAP SS$(I%),SS$(J%)
4090 GOTO 4050
4100 J%=HI%(II%):SWAP SS$(I%),SS$(J%):IF I%-LO%(II%)<HI%(II%-1)
     THEN LO%(II%+1)= LO%(II%):HI%(II%+1)=I%-1:LO%(II%)=I%+1:GOTO 4120
4110 LO%(II%+1)=I%+1:HI%(II%+1)=HI%(II%):HI%(II%)=I%-1
4120 II%=II%+1:GOTO 4020
```

SSM Modem Review

Smart modems often seem destined to outthink their owners. Sometimes this is a function of stubbornness. The SSM smart modem card is compatible with Apple compatible systems, Hayes Micromodem II based software... and most users.

by Steve Rimmer

Modems are an area which even the stoutest of heart will confess a certain fear. They're among the most difficult computer peripherals to work with because their problems are so hard to debug. It's not at all unexpected that the most useful modems are the most difficult to deal with when one is developing software for them.

Conversely, when the beady eyed little port crawlers really do get going, sophisticated "intelligent" modems are a great trip to use. They'll do everything but shine your eyes for you and can make the glorious ordeal of telecommunications really high tech and spiffy.

Remember dialing, waiting for the carrier and then jamming the phone receiver into those cracked rubber cups? Remember the interesting kaleidoscopic effects your screen did whenever the cat walked into the room and burped? Well, you don't have to think about those things any more.

The more well known of the *uber*modems is probably the Hayes Smartmodem. While it has been around for a bit, it's still one of the most useful systems. More recently, there has appeared something called the Micromodem II, a plug in modem card for the Apple][+... and clones thereof... which operates in something like the same way as does the Smartmodem.

The Micromodem is a really decent bit of hardware... so much so that a number of systems have been developed which emulate it. Now, these are not clones in the normal sense of the word, isasmuch as they don't look or work much like the Micromodem. However, they are largely compatible with software designed to drive the Hayes.

One of the most often come upon Hayes compatible Apple modem cards is the SSM modem from Transend. Built in California, the SSM is a little cheaper than the Micromodem and rather more compact, as the Hayes card requires the use of a large external power supply. It will run on any fruit clone and on the Apple IIe.

Purple Hayes

The SSM modem plugs into any slot on the motherboard except for the leperous slot zero which you aren't ever supposed to touch. It's generally popped into slot two, which is recognized as the serial port slot by the majority of software.

The SSM is a complete modem, rather than just a serial port card, so it plugs directly

into the phone lines. There's a small RJ11 jack gorched onto the board for the task and a cable is supplied for the system.

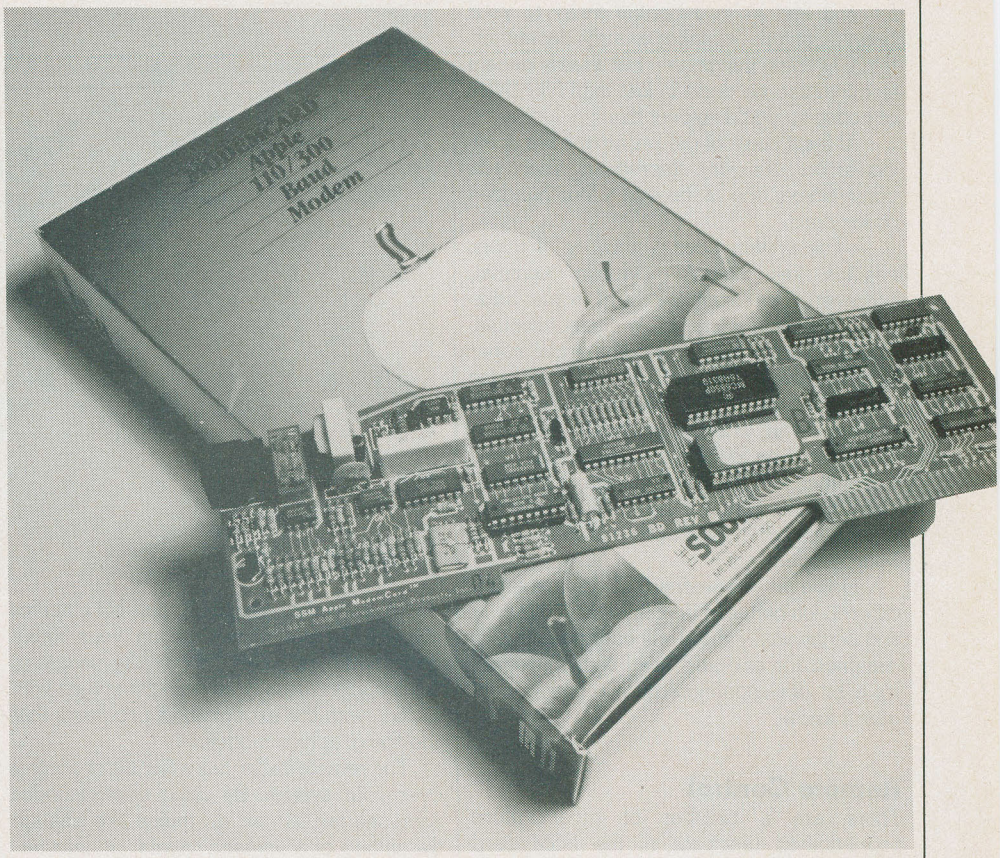
Like many of these newer cards, the SSM modem has an EPROM in amongst its circuitry with quite a bit of intelligence in it. Initialize the card by laying IN#2 and PR#2 on the system and the thing will start looking for someone calling its name.

The SSM modem thinks that its name is control A. Hit a control A and the card will say SSM MODEMCARD: HELLO. A right idiot, actually, this little fellow. If someone called *me* a control A I'd... well, I suppose that some of us must be born modems.

In amongst the firmware smarts of the modem is a simple terminal package. They get you into using that first, as it illustrates a lot of what the card can do. Control A Control F will make it into a terminal. Control A control Q allows you to dial a number. Wait... what's this...

Yes, the dumb terminal actually lets you type in a number and it'll dial the thing for you. You have a choice of touch tone or pulses. In fact, this isn't quite as slick as it sounds because it dials as you type... in other words, you can't backspace if you hit a wrong digit. However, dumbness must have its costs.

Once you've had the thing dial something for you it will wait for a carrier... informing you about what's going on... and, should you actually reach whatever party it is that you're after... the SSM will terminal



The SSM modem card comes complete with a phone cable, on board firmware and a manual. There's also this trendy box.

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SSM Modem Review

for you and let you babble away to your heart's content. It makes a fairly decent terminal as these things go... but a fairly decent terminal can be done in less than fifty bytes of code, so you'd expect this.

At least none of the prompts have spelling errors. It's very depressing when you come across one of these in a four hundred dollar card.

The system does a number of things besides just being a dumb terminal, however. For example, with some additional software it can be a smart terminal. There are a number of commercial super terminal emulators and support things for the Apple which will drive the SSM modem. Most will want to be set up for the particular card they'll be looking at. This actually isn't a problem with the SSM... most of the time... because it emulates a Hayes Micromodem II. Most terminal packages can deal with a Micromodem.

However, be warned. There are a few differences between the Hayes and the SSM and occasionally these will confuse software designed for one and used with the other. It's a bit like shooting squirrels with a bent gun, I know.

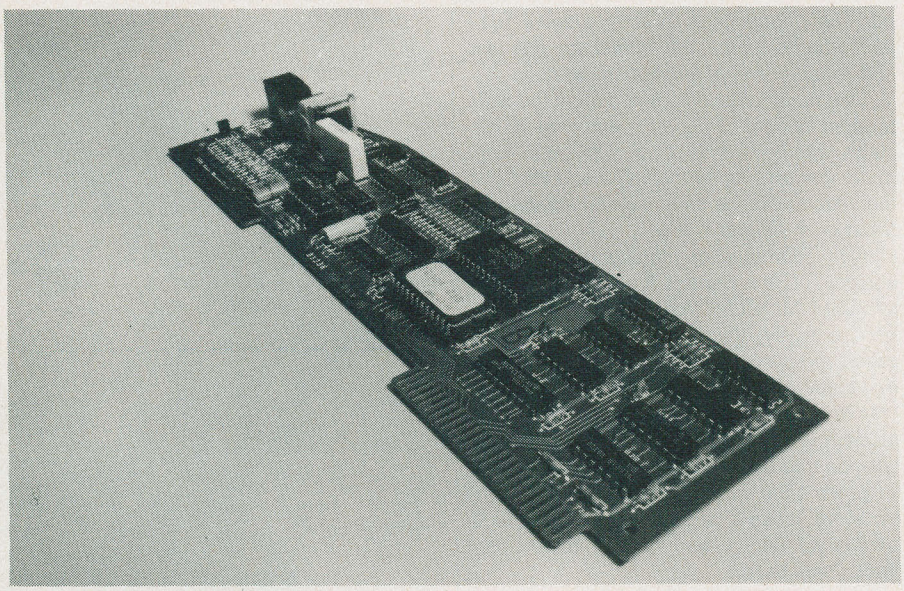
Remote Control

There are a number of other, more sophisticated functions of the SSM card which you'll probably begin to appreciate after you've toodled with the thing for a while. To begin with, it can do what is called *auto answer*. This means that it will sit and vegetate until the phone rings and then electrically answer it, optionally blasting out an answering carrier. This is the stuff of bulletin boards, of course, but it has other functions.

The SSM card can perform a host function for your fruit as well. This means that someone can be sitting at another system clear across town and call yours. The modem will answer the phone, establish contact with the other machine and thereafter the caller will be able to operate your machine as if he were sitting in front of it... except that everything will happen at three hundred baud, of course. In fact, the SSM card also supports one hundred and ten baud for those rare instances when one wants such a facilty, but, being slower still, this represents no immediate solution.

If you can't quite comprehend programming at three hundred baud, try entering SPEED = 125 into your fruit and listing a program.

Still, this capacity can be extremely useful for transferring programs, simple telecommunications and even having someone else help you with your programming problems.



Yes, you can actually call Max across town and have him work on your funky code with you. This host facilty seems to work under virtually anything that runs with DOS... with the exception of programs that use the graphics modes.

The remote caller has a fair bit of control over your system. By using control codes someone far off can do things like change the setting of a linefeed toggle, go into terminal mode for a chat and even hang up the phone. The control N function, which sets the thing to producing line feeds after carriage returns for the remote caller acted a bit funny for the modem we were using inasmuch as it cleared the screen on the local tube and thereafter did all its I/O through the modem exclusively.

The manual didn't mention this aspect of things but, then, as it turns out, there is a fair bit of stuff it doesn't speak of.

Hardware In The Sky

Using the SSM modem at the hardware level is technically no more complex than would be using the Hayes. They are very similar, in fact, both being based around the 6850 ACIA chip. This is actually one of the better choices for use on the Apple... it's a great deal more suited to the 6502 environment than some of 8080 style serial chips that are often pressed into service.

Ahem, however, the real salamander in the mechanism is not on the card itself, but, rather, in the manual. In fact, the book which comes with the SSM is fine for a bit of simple terminalling and so forth. There are a few example programs which will explain how to use the thing for uncomplicated BASIC functions. However, the hardware documentation is the essence of brevity. It has a few quick shots at the register locations and then moves on to greener pastures.

Now, in fact, the information's all there. However, you need a copy of the 6850 data sheet and a fairly decent background in hardware engineering to dig it out.

What makes this all the more uncool is that the card is actually perfectly easy to figure out if you have access to the manual for a real Hayes Micromodem, which is done up rather better. This latter is replete with example programs and all sorts of descriptions of the memory locations involved in using the system and what goes on therein.

It's still a bit baffling, but at least it's available.

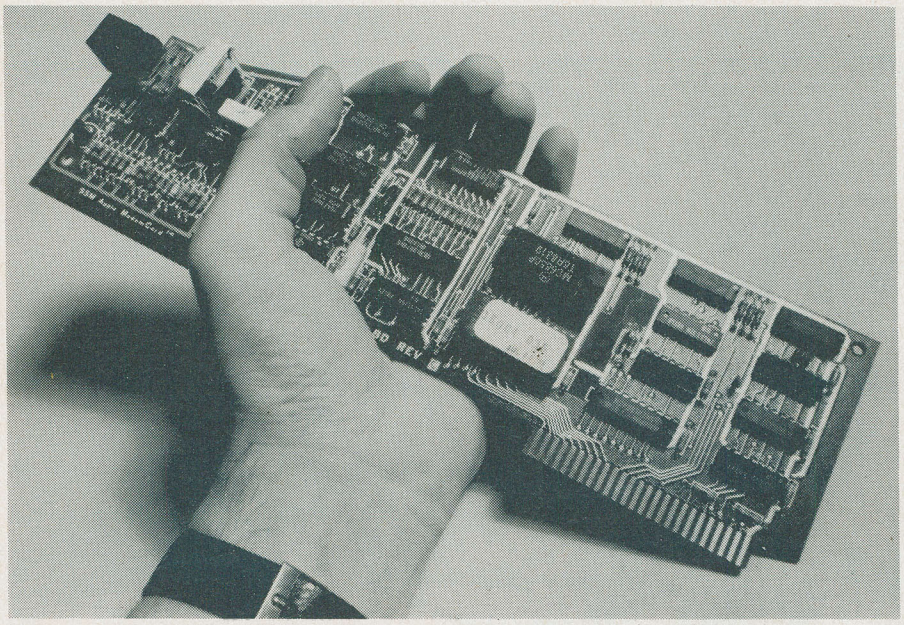
Furthermore, the latter half of the manual for the SSM card is taken up with a reprint of the P.A.M.S. list of bulletin board numbers. This is a directory of dial up systems maintained by the the Public Access Message System down in California. While a decent thing to have, this one is easily a year old and many of its numbers are no longer extant upon the cosmos.

Our own Computing Now! BULL system is, in fact, in there, but at the wrong number. It's listed as being "sexually oriented"... hmmm.

In short, the manual is a dog if you want to burrow into the workings of the card and apply it to your own programs.

Control Z

If you buy one of these things you'll discover that control Z is used to hang up the phone and end a session.



Among the SSM card's attributes is its size. The compatible Hayes Micromodem II would take two hands to hold it and its attendant power supply.

If you want a very clever, sophisticated modem for your Apple compatible system you can do little better than a Hayes Micromodem II. If you want one to use exclusively with a packaged smart terminal program like ASCII Express Pro or VisiTerm and want to shave a hundred dollars off the number beside where they have you sign your name you will probably do as well with an SSM card. It is very similar to the Hayes in most of the important respects.

However, if you like to write tricky programs that play with the low level hardware aspects of the system be prepared to find the SSM highly under documented. It'll do all the right stuff... but you'll have to guess how.

The SSM smart modem card is available from a number of distributors for about four hundred dollars. We got ours from Supertronix, 279 College Street, Toronto, Ontario M5T 1S2. Also available is Transcend, a smart terminal package designed for it.

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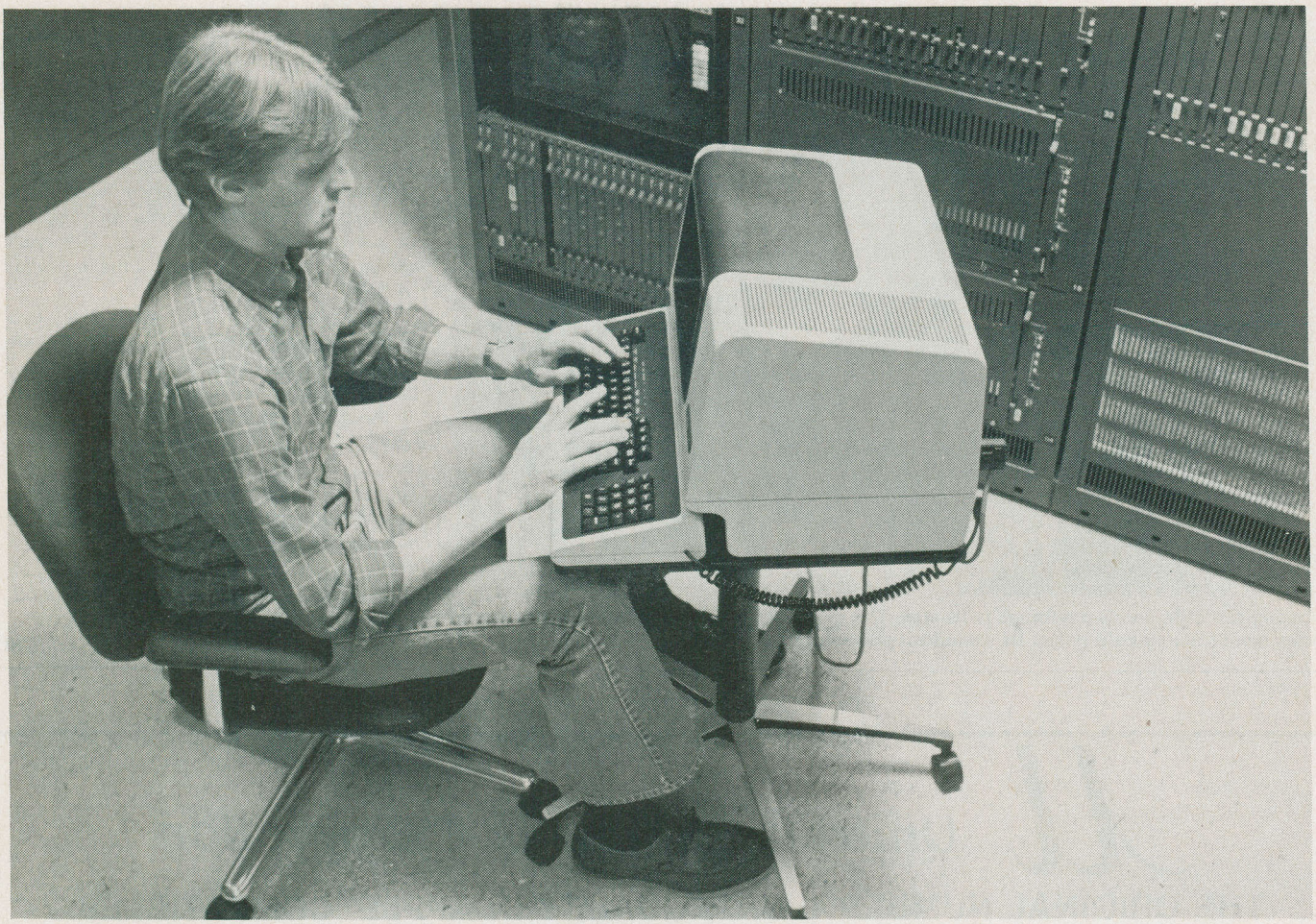


If you'd like to have programmable smart keys on your computer but lack both the programming and the keys you need SMARTS. Working with what you've already got, it converts your dumb, primitive electro-mechanical lashup of a keyboard into an intelligent primitive electro-mechanical lashup of a keyboard. One small step for man...

by Steve Rimmer

One of the least enjoyable aspects of using a computer is in having to type. Most users don't mind typing in stuff that means something . . . for example, a new program or a treatise on the meaning of feet . . . but having to lay the same commands on the computer all the time is a drag.

Fortunately, this can be done away with. As owners of some of the more sophisticated systems probably already know, a computer's keyboard can be equipped with what are called programmable smart keys. These are actually just keys which emit characters which are meaningless to the operating system *per se*, but can be interpreted as something later on through the bytes. So, for example, we might tell the machine that whenever it turns up character number two hundred it should print the string DIR B:WOMBAT.*.

This is fairly useful, because you can program your most used commands into function keys and then just hit the function keys when you want to make things happen.

Sadly, many systems don't have smart key facilities. Equipped with mere QWERTY type keyboards, they cannot dazzle the fingers with single stroke manipulations. This is a real shame, because smart keys look really sharp. As such, we herewith present SMARTS, a simple routine for adding smart keys to a basic CP/M based system.

Intelligence

Making the keys on your keyboard smart is . . . at least conceptually . . . not a difficult thing to do. In this case we are going to have to have the software interpret control characters, inasmuch as the standard typewriter style computer keyboard doesn't have any other useful inessential keys to play with. However, this technique will work for virtually any key values and if you have some unused keys you want to define as being smart you'll be able to load their values into the accompanying program with no trouble.

There are, fortunately, a number of control characters which have no particular meanings under CP/M. You'll want to avoid defining control H . . . it's the backspace . . . control M . . . carriage return . . . and control C, X, R and L. Control Z is occasionally useful, and you'll upset things if you can no longer send control S and P. However, the rest of the range is free for meddling with.

The SMARTS program installs itself in the character handling routines of CP/M and waits . . . drooling . . . for hapless characters to come by. Whenever it gets one, it scrutinizes it to discern whether it matches any of the ones it is supposed to be translating. If it sees that it is innocent it simply sends it on its way.

If it gets a match, however, it gets the name of the command it is supposed to interpret the character as and places it in the CCP console buffer, tricking the mindless creature into believing that it has been given a legitimate command from the keyboard. Then it hands control over to the CCP, which processes the command and does whatever it's supposed to do.

There are several catches in all this, however. The first one is that this code cannot be set up simply as a program. If it were to live down where programs normally reside, the first time it called for a program to be run it would be overwritten and the system would hang.

Secondly, it must interpret characters after they have been gotten from the keyboard. This, in effect, means that it must intercept the call to the console input routine after it has returned clutching its character. In fact, we looked at how to do this in "CONIN The Barbarian" in the January issue of CN!

Finally, it has to boot the program called for by the smart key routine. This is also a bit tricky . . . we found out how it works in "Polish That Buffer" in February.

The source shown here may look a little weird because it actually consists of a program within a program. The main code is just a support routine which keeps things tidy for the real works, which begin at the label "SOURCE". As we've seen before, this stuff is what is called relocating code.

In order to make this thing work properly we must first off stick it somewhere where it won't get hurt. In other words, it must go to live above the transient program area. This means either putting it above CP/M entirely or sticking it in a hole somewhere.

When developing relocating code I usually create an artificially small system with MOVCPM and make the program hide above that. For example, if you have a sixty-four K computer and you make a fifty-six K CP/M system to run in it, you'll have eight K of RAM starting at 0F000H to play with . . . gallons more than you need for most applications.

This is a bit wasteful in real life, though, and for small relocatable things like this it's generally not necessary. Most CP/M implementations have several *holes* in them, that is, areas where there is no active code. You can usually find these with DDT.

The best place to start looking is right below the BIOS. To do this, invoke DDT and do an L0. This will give you something like JMP EC03 . . . that's the jump to the warm boot vector in the BIOS jump table. Round that down to the nearest page, EC00 in this case . . . and you've got the start of the BIOS. Check out the memory directly below this and you'll likely as not discover some vacant real estate. After you've got the program working on a small system change the DEST equate to make it relocate into this tract of bytes and see what happens.

Absolute Control

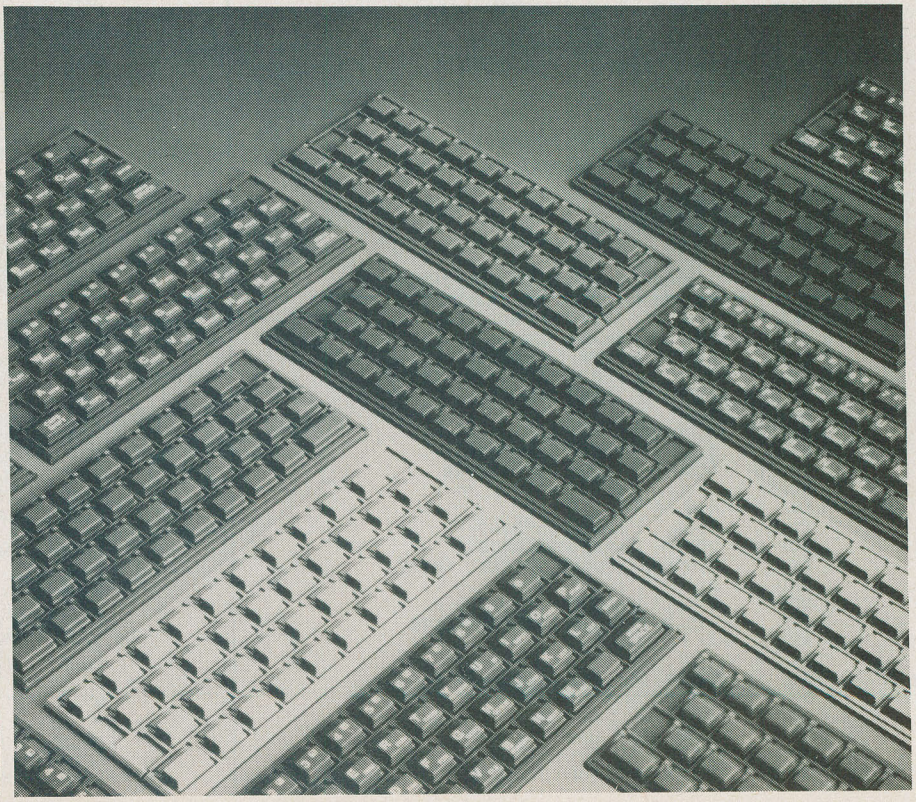
In looking at the program in detail you'll find that it breaks down fairly simply into a number of functions. When you invoke it the first time, it will load the relocating part of itself into the hopefully otherwise unused upper RAM area and patch itself to it. It will also display a menu of the current key definitions.

Subsequent runnings of the program will toggle the smart keys on and off. However, since we don't want to repatch CP/M each time . . . this can cause unpredictable results . . . the support program checks to see what's happening up in high RAM before proceeding to move in the relocating code.

In fact, the program works by altering the BIOS jump table. The address which normally points to the BIOS routine for getting characters is replaced with the value of DEST . . . which is the beginning of the relocated code. This routine is designed to confuse the system into calling the CONIN routine and then returning to the table matching code rather than the caller of CONIN. It does this by fudging the stack and making CONIN execute a return to the wrong address . . . which will do its stuff and then jump back to the caller.

There's a more detailed explanation in the January article if you're interested in the grotty details. Having laboured over the concoction of this, however, I've subsequently been quite happy to simply accept that it works.

The table scanning code itself is fairly simple. It compares the character in the ac-



Get SMARTS

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
;       SMARTS
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;       Not to be sold for profit
;       or traded for Toyota parts
;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
BDOS    EQU     0005H   ;CALL FOR FUNCTIONS
DEST    EQU     0FC00H  ;WHERE CODE WILL RUN
CR      EQU     13      ;
LF      EQU     10      ;
TAB     EQU     'I'-40H ;COSMETICS
KNUM    EQU     4       ;NUMBER OF DEFFINITIONS
TRN     EQU     69H     ;ANY OLD VALUE
TRF     EQU     6AH     ;ANY OTHER OLD VALUE
;
        ORG     0100H
        LXI     H,0
        DAD     SP
        SHLD    STACK
        LXI     SP,STACK ;SAVE THE OLD STACK
;
        LDA     ABLE    ;GET CURRENT STATUS
        CPI     TRN     ;IF IT'S ENABLED...
        JZ      DISABLE ;  ...DISABLE IT
        CPI     TRF     ;IF IT'S IN PLACE BUT DISABLED
        JZ      ENABLE  ;  ...ENABLE IT
        CALL    VCTR    ;PATCH THE CODE
        CALL    PATCH   ;PATCH THE BIOS TABLE
        CALL    MOVE    ;PUT THE CODE IN PLACE
        CALL    HI      ;BE POLITE
;
QUIT    LHLD    STACK
        SPHL            ;RESTORE THE STACK
        RET             ;BACK TO CP/M
;
ENABLE:
        MVI     A,TRN   ;LOAD A WITH 'ON'
        STA     ABLE    ;STASH IT
        CALL    HI      ;SAY WE'RE FLYING
        JMP     QUIT    ;BE GONE
;
DISABLE:
        MVI     A,TRF   ;LOAD AWITH 'OFF'
        STA     ABLE    ;STASH IT
        MVI     C,9     ;PRINT THE
        LXI     D,NOPATCH       ;MESSAGE
        CALL    BDOS
        JMP     QUIT
;
NOPATCH DB      CR,LF,TAB,TAB,'Soft key '
        DB      'functions disabled.',CR,LF,'$'
HI:
        MVI     C,9
        LXI     D,HELLO
        CALL    BDOS    ;SAY HELLO
;
        MVI     B,KNUM  ;NUMBER OF DEFFINITIONS
        LXI     H,TABLE ;POINT TO TABLE
DISLOOP MOV     A,M     ;GET CONTROL CODE
        ADI     '@'     ;MAKE ASCII
        STA     CHAR    ;PUT IN BUFFER
        INX     H       ;POINT TO DEFFINITION
        PUSH B ! PUSH H ;SAVE REGS
        MVI     C,9
        LXI     D,CONTR
        CALL    BDOS    ;PRINT 'CONTROL'
        POP H ! PUSH H  ;RESTORE POINTER
        XCHG            ;GET POINTER IN D
        MVI     C,9
        CALL    BDOS    ;PRINT STRING
        POP H ! POP B   ;RESTORE REGS
        LXI     D,000FH ;POINT TO NEXT ENTRY
        DAD     D       ;
        DCR     B       ;DONE?
        JNZ     DISLOOP ;LOOP 'TIL COMPLETE
        RET
;
HELLO   DB      CR,LF,TAB,TAB,'Soft key '
        DB      'functions enabled.'
        DB      CR,LF,LF,TAB,TAB,'Copyright '
        DB      '1984 (c) Steve Rimmer'
        DB      CR,LF,'$'
CONTR   DB      CR,LF,TAB,TAB,'Control '
CHAR    DS      1
SEPR    DB      ' = $'
;
PATCH:
        LHLD    0001H   ;GET LOCATION OF WARM BOOT
        LXI     D,7     ;POINT TO CONIN
        DAD     D
        LXI     D,DEST  ;CHANGE IT SO IT POINTS TO
        MOV     M,E     ;WHERE THE NEW CODE WILL GO
        INX     H
        MOV     M,D
        RET
;
VCTR:
        LHLD    0001H   ;GET LOCATION OF WBOOT
        LXI     D,7     ;POINT TO CONIN
        DAD     D
        LXI     D,VCON+1 ;PUT THE ADDRESS OF WHERE
        MOV     A,M     ;CONIN POINTS IN THE CODE
        STAX    D       ;WHICH WILL GET RELOCATED
        INX     H       ;IN A MINUTE
        INX     D
        MOV     A,M
        STAX    D
        RET
;
MOVE:
        LXI     B,PEND-START+1
        LXI     H,DEST+PEND-START+1
        LXI     D,SOURCE+PEND-START
MVLP    LDAX    D       ;GET A BYTE
        DCX     H       ;BUMP COUNTER
        MOV     M,A     ;PLACE THE BYTE
        DCX     D       ;BUMP COUNTER
        DCX     B       ;BUMP COUNTER
        MOV     A,B     ;ARE WE DONE?
        ORA     C
        JNZ     MVLP    ;IF NOT, GO FOR IT
        RET
;
SOURCE  EQU     $
OFFSET  EQU     DEST-SOURCE
START   EQU     $+OFFSET
        POP     D       ;GET RETURN ADDRESS
        LXI     H,XCON+1 ;PUT IT AS JUMP
                         ;FOR LOOKUP ROUTINE
        MOV     M,E
        INX     H
        MOV     M,D
        LXI     D,LOOKUP ;FOOL STACK SO
                ;CALLER RETURNS TO
        PUSH    D       ;LOOKUP TABLE
VCON    JMP     $-$     ;DO NORMAL CONIN
;
LOOKUP  EQU     $+OFFSET
        MOV     D,A     ;SAVE A
        LDA     ABLE    ;GET STATUS
        CPI     TRN     ;TRANSLATION ENABLED?
        JNZ     NOCON   ;IF NOT, GO AWAY
        MOV     A,D     ;OTHERWISE, RETURN A
;
        LXI     H,TABLE ;START OF TABLE
        LXI     D,16    ;LENGTH OF TABLE ENTRY
        MVI     B,KNUM  ;NUMBER OF ENTRIES IN TABLE
LOOKLP  EQU     $+OFFSET
        CMP     M       ;MATCH?
        JZ      MATCH
        DAD     D       ;POINT TO NEXT ENTRY
        DCR     B
        JNZ     LOOKLP
        JMP     XCON
MATCH   EQU     $+OFFSET
;
        SHLD    MPOINT  ;SAVE IT
;
        XCHG    ;POINT TO TABLE ENTRY
        MVI     C,9     ;SET UP TO...
        CALL    BDOS    ; ...PRINT THAT THANG
        LHLD    0001H   ;GET POINTER
                        ;TO BIOS JUMP TABLE
        MVI     L,00H   ;POINT TO BEGINNING
                        ;OF THAT PAGE
        MOV     A,H
        SUI     16H
        MOV     H,A     ;POINT TO CCP
```
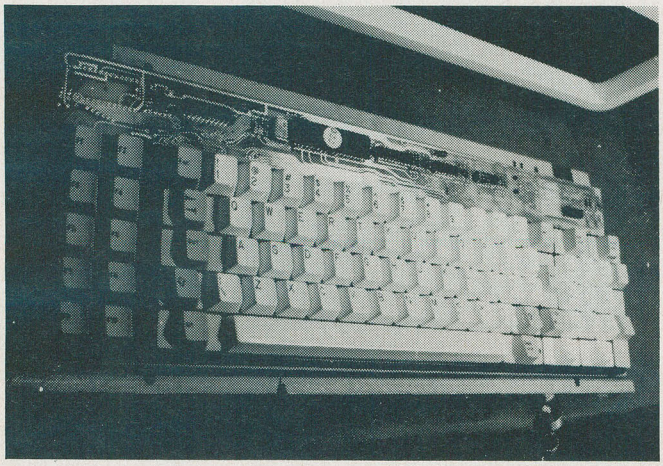

```
        SHLD    CCP       ;SAVE LOCATION OF CCP
        PUSH    H         ;SAVE H
        LHLD    MPOINT    ;GET NAME...
        XCHG    ; ... INTO D
        POP     H         ;GET H BACK
        LXI     B,0FH     ;LENGTH OF COMMAND
        MVI     L,7       ;POINT TO COMMAND BUFFER
        CALL    MOVCOM    ;MOVE COMMAND
        LHLD    CCP
        MVI     L,88H     ;POINT TO LSB CCP POINTER
        MVI     A,8
        MOV     M,A       ;PUT 8 IN IT
        LHLD    CCP
        MVI     L,89H     ;POINT TO USB CCP POINTER
        MOV     A,H
        MOV     M,A
        POP     H         ;GET RETURN ADDRESS
        LHLD    CCP       ;GET LOCATION OF CCP
        PCHL    ;FILL PROGRAM COUNTER AND RIP
;
MOVCOM  EQU     $+OFFSET
        LDAX    D         ;GET BYTE FROM COMMAND
        MOV     M,A       ;PUT IT IN THE BUFFER
        INX     H         ;POINT TO NEXT IN BUFFER
        INX     D         ;POINT TO NEXT IN COMMAND
        DCX     B         ;DECREMENT COUNTER
        MOV     A,B       ;GET COUNTER IN A
        ORA     C
        JNZ     MOVCOM
        RET
;
NOCON   EQU     $+OFFSET
        MOV     A,D       ;PREPARE TO GO TO CALLER
XCON    EQU     $+OFFSET
        JMP     $-$       ;GO BACK TO CALLER
TABLE   EQU     $+OFFSET
        DB      'D'-40H,'D',00,'$'
        DS      16-(($+OFFSET)-TABLE)
TABLE1  EQU     $+OFFSET
        DB      'B'-40H,'MBASIC',00,'$'
        DS      16-(($+OFFSET)-TABLE1)
TABLE2  EQU     $+OFFSET
        DB      'A'-40H,'DISK',00,'$'
        DS      16-(($+OFFSET)-TABLE2)
TABLE3  EQU     $+OFFSET
        DB      'L'-40H,'DDT',00,'$'
        DS      16-(($+OFFSET)-TABLE3)
```



```
CCP     EQU     $+OFFSET
        DS      2         ;SAVE CCP HERE
MPOINT  EQU     $+OFFSET
        DS      2
ABLE    EQU     $+OFFSET
        DB      TRN       ;SAVE STATUS
;
PEND    EQU     $+OFFSET
;
        DS      60
STACK   DS      2         ;LOCAL STACK
;
        END
```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Get SMARTS

cumulator with the first byte in each of the table entries. If it gets a match, it loads the subsequent characters in the entry into the CCP buffer and boots things. Otherwise, it does a jump to the return address of the caller.

The table itself may look a little weird. In fact, what all that code means is that, to begin with, the table relocates along with the rest of the code and, secondly, all the entries are padded out to sixteen characters long no matter how many characters are actually in them. The expression: DS 16 - (($+OFFSET) - TABLE) tells the assembler to add sixteen minus the length of the entry bytes of space to each entry. This, while a bit wasteful of space, makes the scanning code a great deal simpler and faster.

Hacking It

Needless to say, you don't have to define things the way I have. You can have as many entries into the smart key table as you like. The value for KNUM, up at the top, should reflect the number of keys you want to enlighten. You can install any definitions you like in the table, provided you keep to the form shown here and that you keep the strings down to fourteen characters or less.

You will also have to change the DEST value for your system, as we've seen.

If you do have function keys on your keyboard you can translate them if you fancy. In the likely event that your documentation fails to mention what they emit, you can use a small BASIC routine to discover their character values.

```
10 C$ = INPUT$(1)
20 PRINT ASC(C$)
30 GOTO 10
```

Very often they'll turn out to be doing control characters.

If you find that your keys are actually doing high order characters . . . those with values above 128 . . . you'll probably want to change the HI: routine to have the menu make sense. Make the CONTR string read:

```
CONTR   DB   CR,LF,TAB,TAB,'Function $'
```

and the line below DISLOOP go:

```
ADI  [n] + '1'
```

where the little n is the value spewed out by your F1 key. Obviously, you'll want to put the values of your function keys in the table area.

Having gotten everything patched and ready to rip, assemble and load the code and run the program. You should get the message that tells you that the keys are enabled. If you hit one of the control or function keys that you've placed into the table, the appropriate program should boot up.

If you run SMARTS again you'll get a message that says that the keys are disabled and all should be as it was. Run it for a third time and the keys will come back.

If you do a lot of work on your system at the command line level SMARTS will make your life much more karmic.

At the very least it will save your disks the hardship of looking for programs like MBAISC, DIE, PIPP and the other offshoots of typing a bit too fast. **CN!**

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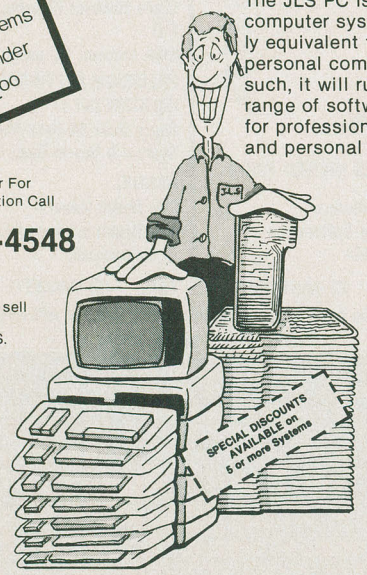

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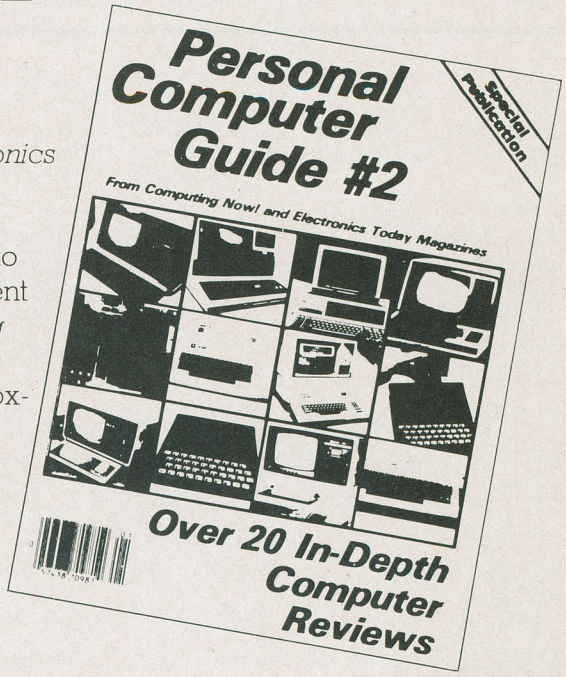

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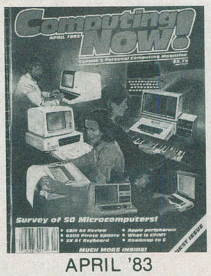

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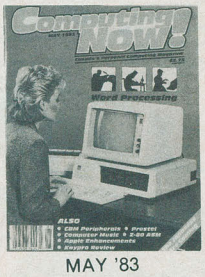

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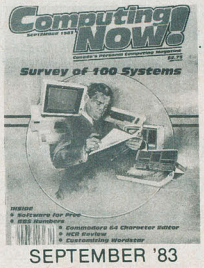

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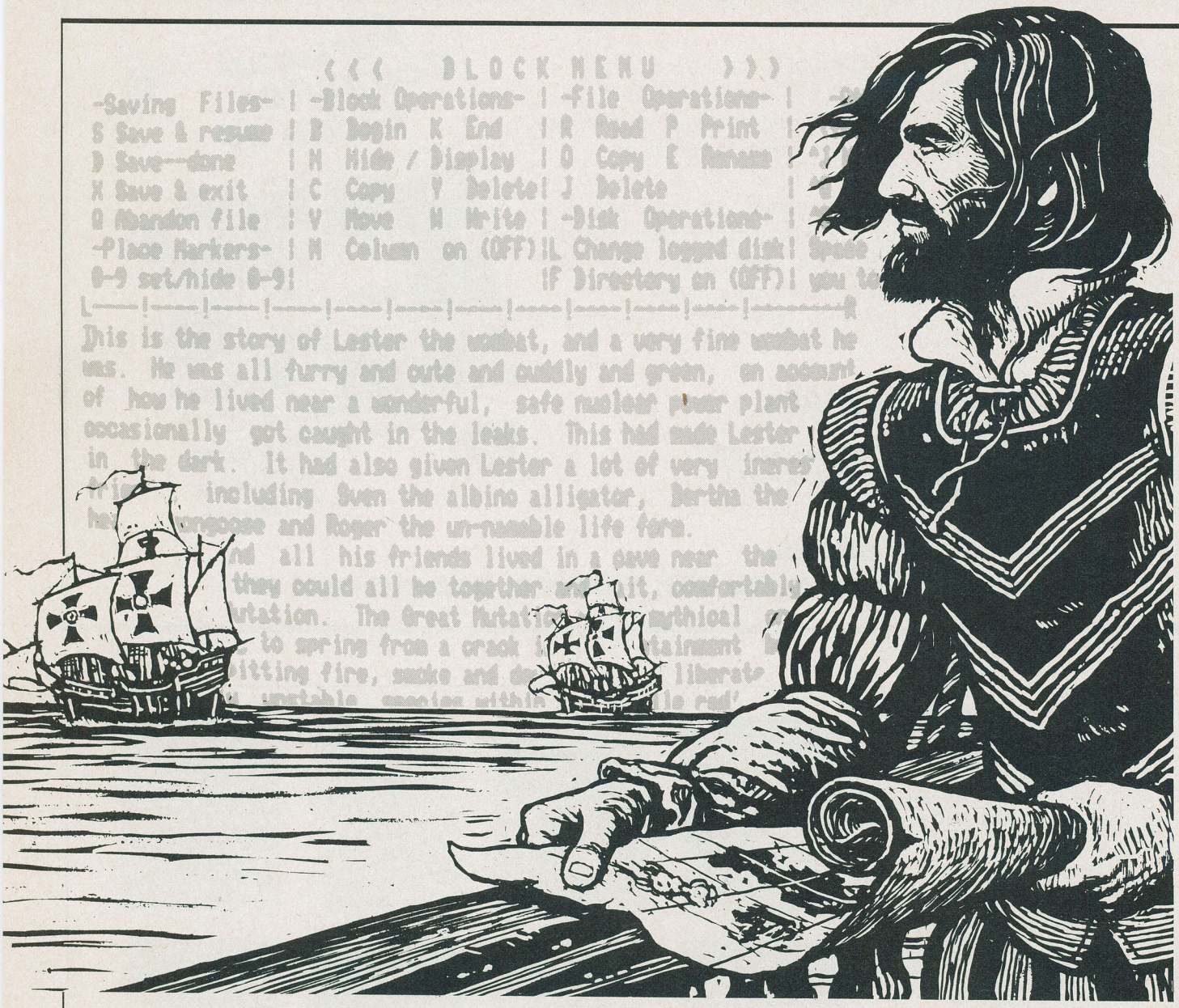
Search For Wordstar



The capacity of WordStar to do multiple searches and search and replace functions in large documents can be extremely powerful if you get into the subtleties and nuances of its workings. Here's a quick scan.

by Steve Rimmer

One of the really splendid aspects of WordStar is the hierarchy of its features. You can get into using the program with a minimum amount of sweat... and as you have need for special capabilities you can check 'em out on the menu... or even in the manual if you acquired your software legitimately... and get them together.

The search and replace features of this popular word processor are usually one of the last things users of it get into. Having the power to thoroughly garbage a document if used incorrectly, the search and replace is one of those things that most people would rather leave tucked away in a cobweb encrusted corner of the Q menu for future generations to find.

This, of course, is cowardly and really a drag, inasmuch as there is an awful lot that can be managed with these things. We'll get into some of them presently.

Fetch, Fido

The two basic incarnations of the search and search and replace features of WordStar are called by hitting control Q and F and control Q and A respectively. This will allow you to specify what you want to be searched for, what you want it replaced with and how the process is to work.

The search only, control Q and F, is fairly straightforward. It will find the first occurance of the string you tell it to look for in your file starting with the present location of the cursor. Control Q and R and control Q and F followed by a string... "Bandicoot"... will find the first time "Bandicoot" shows up in your document.

There are, however, a number of options one has in doing searches. You can do a "B" search, for "backwards". The system can also be instructed to ignore the case of the thing being searched, so, for example, it would find "Bandicoot" and "bandicoot" if told to work in this mode. Finally, it will let you specify a search for whole word only. Thus, it would find "bandicoot" but not "bandicoots".

If you do a control Q and A the program will search for something and replace it with something else. This is useful, for example, if you discover that you've just created a sixteen K document with the same word spelled wrongly throughout it. You would do a control Q and A, the misspelled word... "futbath", the proper spelling... "footbath", and then the options G and N. This means that you want a global search and you'd rather not be asked about each replacement. If you omit the "N" the system will stop at each match in the text and ask you if you want to replace it.

There is a very useful trick involved in this. WordStar likes an audience, and will happily format the text as it goes, displaying each replacement on the tube. This gets dull very quickly. If you hit a carriage return while it's happening, however, all screen activity will stop until the ordeal is completed, at which point WordStar will show you the bottom of your document. This speeds things up considerably.

Don't be alarmed if the disk drives run a lot during a long global search and replace... WordStar keeps its scratch files and pointers on disk to tell itself where it is in your document.

In Control

One of the most useful aspects of the searching functions of WordStar is that they will also search for control characters. These are unprintable symbols which cause the text to behave in a certain way. For example, every time you put a hard carriage return in your text... indicated by a left arrow symbol on the right hand side of the screen... you are actually installing two characters in your file. These are called carriage returns and line feeds.

Manipulating the control characters can make changing formats a short walk in the grass...

Control characters are often referred to as control keyed alphabetic characters. You use these to move around the screen and so the other functions of WordStar. However, it's important to keep in mind that the control characters you type are all trapped by WordStar and used to do other things... they don't normally go to the screen directly.

Manipulating the control characters in your documents can make changing their formats a walk in the short grass. For example, suppose you want to take a document like this article, with each paragraph following the last, and install a blank line between each paragraph. You could do it by hand, but you could also change the control characters around.

A carriage return is, in fact, a control M. A line feed is control J. Thus, to get the blank lines in what you'd have to do would be to find all the occurances of control M control J and replace them with two pairs of control M and control J.

The way you tell WordStar to accept a control character literally, rather than interpreting it as a function command is to hit control P and then the character you want to make happen. However, if you type a control P control M you will find that the command line won't show you a control M symbol, but, rather, will move the cursor to the left hand side of the screen, the usual result of a control M, or carriage return. A control P control J will move it down one line. While a bit messy to look at, this is cool and means that WordStar is accepting your characters properly. Most other control characters will be displayed symbolically.

If you want to find the soft ends of lines... that is, where WordStar has wrapped your text around for you, you can search for control N. If you have a need for unformatted text... that is, a document with no returns... remove all the control Ns. You can remove characters with search and replace by having WordStar search for something and replace it with nothing. When it says "REPLACE WITH" just hit return.

This will leave you with one very long line.

We use the search and replace quite a lot to replace the pseudo tab characters in a WordStar file with real ones. If you hit the TAB key when WordStar is in its document mode you'll actually get five regular old space bar spaces. A real tab, however, is a control I character, which is customarily interpreted as being eight spaces. Thing is, the character itself is only one character wide, so it can be deleted with one operation. More to the point, our typesetting equipment... and many printers... are happier with real control I tabs.

You can have control I tabs by simply searching for five blank spaces and replacing them with control I. This will only affect the pseudo tabs you've put in, by the way, because, while there would seem to be spaces at the ends of paragraphs WordStar regards these areas as being empty of all characters and thus won't try to do anything with 'em.

There are other hidden mysteries of control Qs. For example, if you do either a search or search and replace for one occurance of something... that is, without the G option... you can make WordStar repeat the search for next occurance along in your file if you hit control L. You've probably wondered what that one was for.

Along the same lines, you'll find that if you hit a control R on one of the command lines of the searching menu... such as when it's asking you what you want it to search for, it will bring up the last string you used. You can edit this if you feel a need to.

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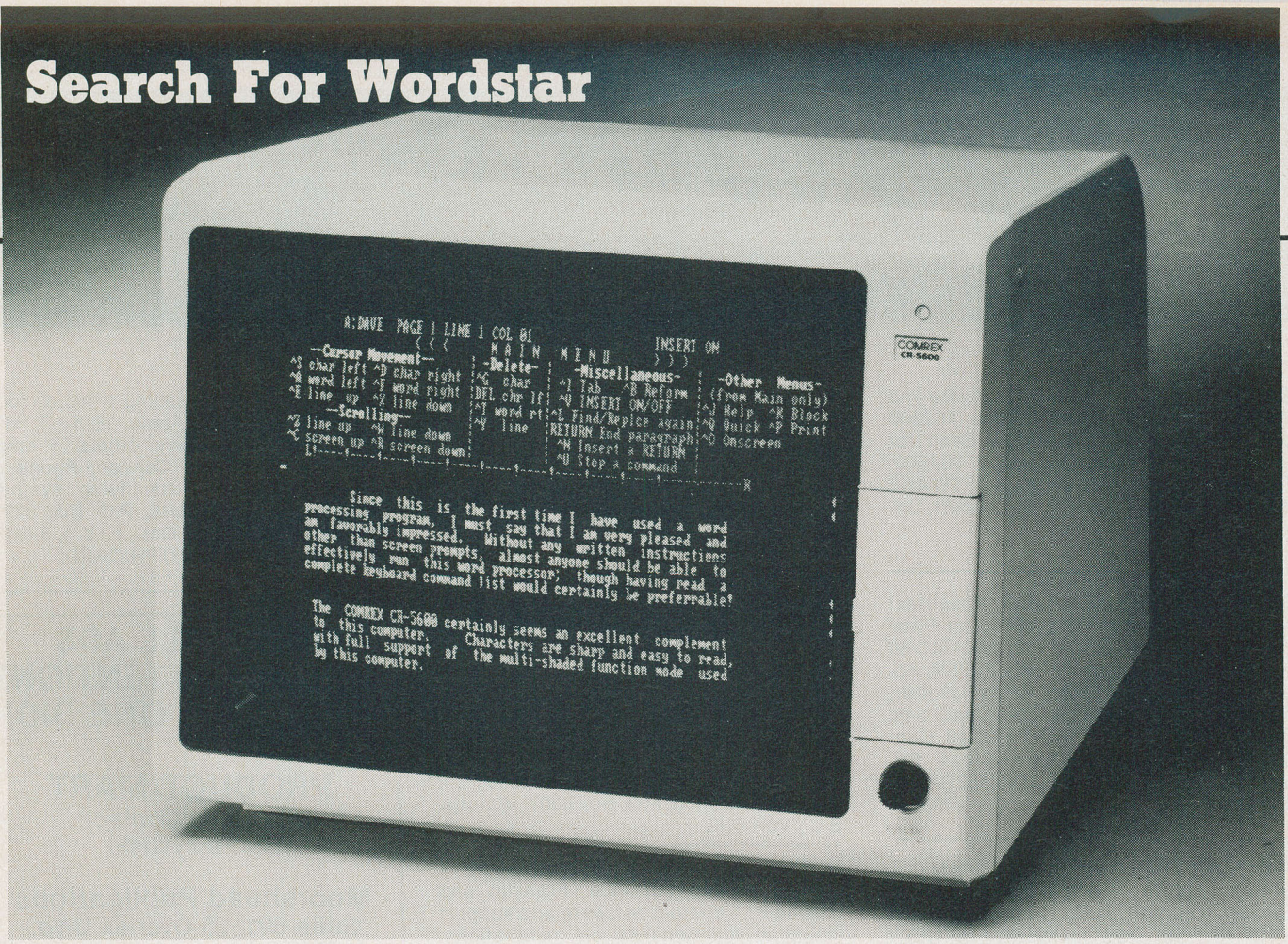
Search For Wordstar



If you enter a number as an option instead of one of the letters the thing wants the search and replace will take place that number of times. This, in itself, offers one a useful trick because it lets you do a search to the end of your file as opposed to a global search if you want to.

If you call for a global search WordStar moves its cursor up to the top of your file and lets it rip. However, you may only want to work with the second half of your document. In this, case, do a non-global search and call for it a huge number of operations when the menu asks for options. This will take you down to the end of your file and throw an error message because the string you've been looking for won't be there that number of times. Hit escape to put the software back in its place.

Finally, if you are in the middle of a long search and you suddenly realize that you've made the mistake of your entire cosmic existance you can interrupt the process by hitting control U and then escape.

Very Advanced Tricks

There are a few other tricks which WordStar has built-in to make its searching capabilities even more useful. Among the neatest is the availability of place markers.

It's very often the case that you'll be tooling through a document and you'll want to go somewhere else and then return to where you where. For example, you may find a frequently misspelled word that you want to search and replace into compatibility and then continue looking through the text. This is a job for... the mighty place markers.

Actually, they're really rather humble. If you put the cursor somewhere and do control K followed by a number from zero to nine you will discover that there will appear a place marker in your text. It will be the number you've typed surrounded by arrow heads. If you then go somewhere else and do a control Q and that number the cursor will find your marker. You can kill a marker by moving the cursor to it and doing another control K and its number.

You can, obviously, have as many as ten markers in your text at a time. You can move 'em around as much as you like. They're particularly useful in editing programs with WordStar, as they let you find particular parts of your trackless code without a lot of searching and guessing.

Finally, there is the searching which works in conjunction with SpellStar, WordStar's pet spelling checker. This is a specialized searching function capable of looking for only a single character, this being the one SpellStar uses to mark words it doesn't recognize. The character used is a null, or control "@" sign. It's called up by control Q and L.

When you run SpellStar it "marks" your file with these nulls and then pops you back into WordStar to do some fixing. It's actually fairly convenient. However, finding the nulls would be a bit tedious. In fact, a null is one of the few characters which you can't search for or replace with under the normal control Q functions.

If you use the control Q and L function, WordStar will pop you along from error to error, allowing you to fix your mistakes. However, it will also, optionally, swallow the word it's marked and add it to a dictionary. Thus, for example, it can create a dictionary of specialized words not in its file as you roll.

Find It

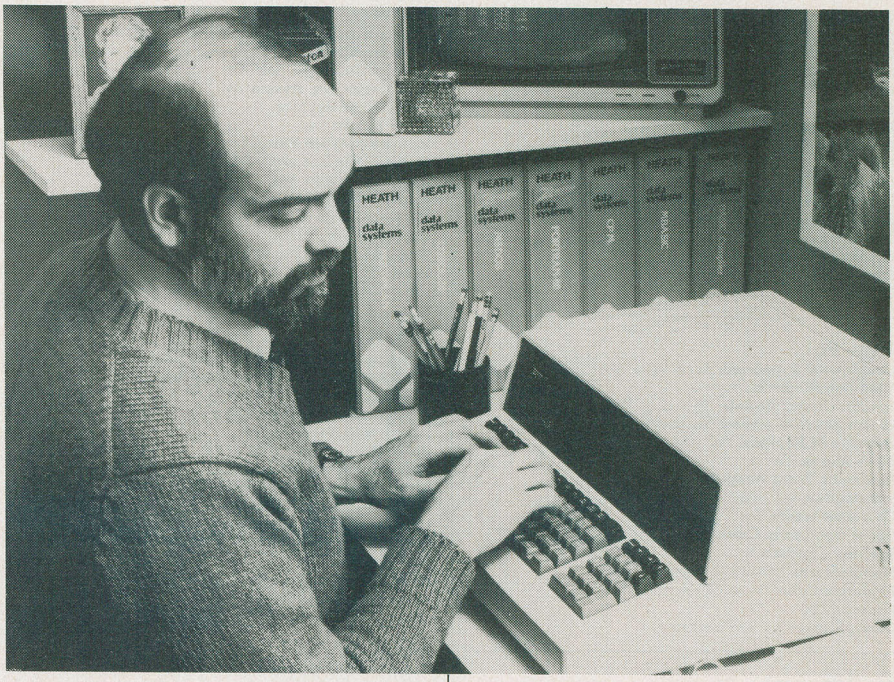
Using the searching features of WordStar effectively will make handling large documents a great deal easier. It will also make using this package a lot more efficient as a program source editor and, if you are working with a system that has small disks, such as the Apple II under CP/M, it will allow you to make better use of the scratch file space available when you're using large source files.

However, the best part about this aspect of WordStar, is that it looks so neat when its working. It fairly clips along, doing all kinds of work that you know would take you hours and just making life wonderful.

We recently tried having do a global replace to remove all Liberal politicos and insert strings of random punctuation... I think it was successful, but it's so hard to tell for sure. **CN!**

Word Processors Survey

Reed to papyrus, stylus to clay, chisel to stone, pen then metal to paper, and finally ASCII to output... the expression of man's thoughts has come a long way.



No matter what micro computer you swear by, there's probably a word processor for it, buried deep in your dealer's shelves. The more popular your micro is, the more likely there's a varied selection to choose from.

Why do you need one? If you do any writing at all, you'll likely appreciate the fact that you can manipulate your prose until it looks exactly like you want it to before printing it out. This saves untold reams of paper and gallons of white-out.

Justification's a blast. With a typewriter, a good guess is necessary to determine the exact centre placement of a line or paragraph of text. On most word processors, a two key command will do the same thing in seconds. Fill justification, where creative padding permits each line to be the exact length is an impossibility on a manual typewriter. Again, a few deft jabs at whatever keys the program's manual tells you to hit will produce the desired effect.

Perhaps a word processor's most appealing feature is the 'search and replace' function, where words or sentences can be sought out and optionally replaced by whatever's felt to be a better way of putting things.

This is a survey of a number of the more popular word processors presently bearing price stickers at your local software store. You'll likely have to try a number of them out personally... and suffer the slings and arrows of salesmen... before finding one that feels comfortable, but you'll wonder how you lived without it after making a place for it in your software collection.

Super-Text Professional

Computer(s) Supported: Apple][, //e, Commodore 64
RAM Required: 64K
Special Character Sets: Characters for 80 columns
80 Columns On-screen: Yes; through software
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap:
Justification: Right, left, centre
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Muse Software
Available From: International Marketing Services
Price: $124.00
Other: Split screen option

Quick Brown Fox

Computer(s) Supported: VIC-20, Commodore 64, IBM-PC
RAM Required: 4K (VIC), 64K (C64)
Special Character Sets: No
80 Columns On-screen: Yes, with Data 20 Video Pak
Search and Replace: Replace only
Block Moves: Yes
Automatic Word Wrap:
Justification: Left
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: The Quick Brown Fox Company
Available From: Mr. Software
Price: $99.95
Other: Boiler Plates

Bank Street Writer

Computer(s) Supported: Apple][, Atari, Commodore 64
RAM Required: 48K
Special Character Sets: No
80 Columns On-screen: No, uses scrolling
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Broderbund Software
Available From: Softsource
Price: $59.95
Other: "Unerase" function

Magic Window II

Computer(s) Supported: Apple][, //e
RAM Required: 48K
Special Character Sets: Yes, used with 70 column feature
80 Columns On-screen: Yes, with software or optional firmware
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Artsci
Available From: Exceltronics
Price: $189.00
Other: Menu-driven

Ace Writer

Computer(s) Supported: Franklin 1000, 1200
RAM Required: 48K
Special Character Sets: Yes, used with 70 column feature
80 Columns On-screen: Yes, with software or 80 column card
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Artsci
Available From: General Electronics
Price: $49.95
Other: A licensed version of Magic Window II

Apple Writer //e

Computer(s) Supported: Apple][, //e
RAM Required: 64K
Special Character Sets: No
80 Columns On-screen: Yes, with appropriate firmware
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes; may be disabled if desired
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Apple Computer
Available From: Exceltronics
Price: $210.00
Other: Help screens, split screens

Perfect Writer

Computer(s) Supported: Most Z-80 and 8088 based systems
RAM Required: 64K
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: Optional; Perfect Speller
Manufacturer: Perfect Software
Available From: Computer Junction
Price: $249.00
Other: Multiple file display

Word Processors Survey

WordStar 3.3
Computer(s) Supported: Most Z-80 and 8088 based systems
RAM Required: 48K
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: Optional; SpellStar
Manufacturer: MicroPro
Available From: Exceltronics
Price: $589.00
Other: On-screen help menus

Pen—Pal
Computer(s) Supported: Apple][, //e
RAM Required: 48K
Special Character Sets: No
80 Columns On-screen: No, uses scrolling
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: No
Justification: Left, right
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Howard W. Sams
Available From: Lenbrook Electronics
Price: $84.95
Other: Supports modem transfers

Word Handler
Computer(s) Supported: Apple][, //e
RAM Required: 48K
Special Character Sets: Yes; 66 column format
80 Columns On-screen: 66 columns in software, or 80 scrolling
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left
Character Insert:
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Silicon Valley
Available From: Gladstone Electronics
Price: $229.95
Other:

Screenwriter][
Computer(s) Supported: Apple II, //e
RAM Required: 48K
Special Character Sets: Yes; 70 column software
80 Columns On-screen: Yes, in software
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Sierra Online
Available From: Softsource
Price: $139.95
Other:

Benchmark
Computer(s) Supported: Apple, IBM, other CP/M or MS-DOS systems
RAM Required: 64K
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Metasoft
Available From: Softsource
Price: $479.95
Other: Help menu, merge capabilities

VisiWord
Computer(s) Supported: IBM-PC,
RAM Required: 128K
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: VisiCorp
Available From: The Original Software Source
Price: $369.00
Other: Software print spooling, split screen

PFS:Write
Computer(s) Supported: IBM-PC, Apple //e
RAM Required: 64K Apple, 128K IBM
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: PFS
Available From: The Original Software Source
Price: $126.00
Other: Help screens

MacWrite
Computer(s) Supported: Apple Macintosh, Apple Lisa 2
RAM Required: 128K
Special Character Sets: Yes; many and varied
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Apple Computer
Available From: Apple Canada
Price: Presently accompanies the computer. $150.00 after introductory period.
Other: Easily interfaceable with MacPaint

The Writer
Computer(s) Supported: Apple][, //e, IBM-PC
RAM Required: 48K
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes; IBM. Upper case letters shown in inverse on 40 column Apple
Spelling Checker: Optional for IBM - The Speller
Manufacturer: Hayden Software
Available From: Local dealers
Price: $65.00
Other: Includes mail merge, help screens, IBM version supports colour

PIE: Writer
Computer(s) Supported: Apple][, //e, IBM
RAM Required: 48K
Special Character Sets: No
80 Columns On-screen: Yes; IBM, Apple firmware cards supported.
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes; IBM. Upper case letters shown in inverse on 40 column Apple
Spelling Checker: Optional; PIE:Speller
Manufacturer: Hayden Software
Available From: Arkon Electronics
Price: $187.50
Other: Integrated telecommunications capability, mail merge

Palantir
Computer(s) Supported: Most CP/M and MS-DOS computers
RAM Required: 56K
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Designer Software
Available From: A.M.I.E.S.
Price: N/A
Other: Accompanying mail merge program

SmartWriter
Computer(s) Supported: Coleco Adam
RAM Required: 80K
Special Character Sets: No
80 Columns On-screen: No; uses scrolling
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Coleco
Available From: Gladstone Electronics
Price: $999.00; integrated with Adam
Other: Undo feature

PaperClip
Computer(s) Supported: PET, Commodore 64
RAM Required: 64K
Special Character Sets: Yes, with 80 column software
80 Columns On-screen: Yes, either software or hardware
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: Optional integrated SpellPack
Manufacturer: Batteries Included
Available From: Batteries Included
Price: $99.00; $149.00 with SpellPack
Other: PET versions on ROM

Script 64
Computer(s) Supported: Commodore 64
RAM Required: 64K
Special Character Sets: No
80 Columns On-screen: Yes, through software
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: May be purchased or user-compiled
Manufacturer: Richvale Telecommunications
Available From: Richvale Telecommunications
Price: $129.00
Other: Includes mailing list program

WordPro
Computer(s) Supported: Commodore PETs, Commodore 64
RAM Required: From 32K to 96K depending on hardware
Special Character Sets: No
80 Columns On-screen: Yes, depending on hardware
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: Optional; SpellPro, SpellRight Plus
Manufacturer: Professional Software, Pro-Line Software
Available From: Local Commodore dealers
Price: Varies according to version
Other:

Volkswriter Deluxe
Computer(s) Supported: IBM PC, IBM XT
RAM Required: 64K
Special Character Sets: No
80 Columns On-screen: Yes
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Lifetree Software
Available From: Mid Canada Software
Price: $267.00
Other:

HES Writer
Computer(s) Supported: Commodore 64, Vic 20
RAM Required: Depends on hardware
Special Character Sets: No
80 Columns On-screen: No
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Human Engineered Science
Available From: Mr. Software
Price: $52.95
Other: Chain printing, wildcard search

Cut and Paste
Computer(s) Supported: Commodore 64, Apple][, Apple //e
RAM Required: 48K to 64K
Special Character Sets: No
80 Columns On-screen: Depends on hardware
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Electronic Arts
Available From: Mr. Software
Price: $74.95
Other:

Homeword
Computer(s) Supported: Commodore 64, Apple][, Apple //e
RAM Required: 48K to 64K
Special Character Sets: No
80 Columns On-screen: Depends on hardware. High res "window"
Search and Replace: Yes
Block Moves: Yes
Automatic Word Wrap: Yes
Justification: Left, right, centre, fill
Character Insert: Yes
Upper and Lower Case: Yes
Spelling Checker: No
Manufacturer: Sierra Online
Available From: Mr. Software
Price: $69.95
Other: Uses icons

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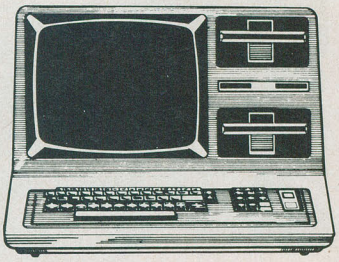

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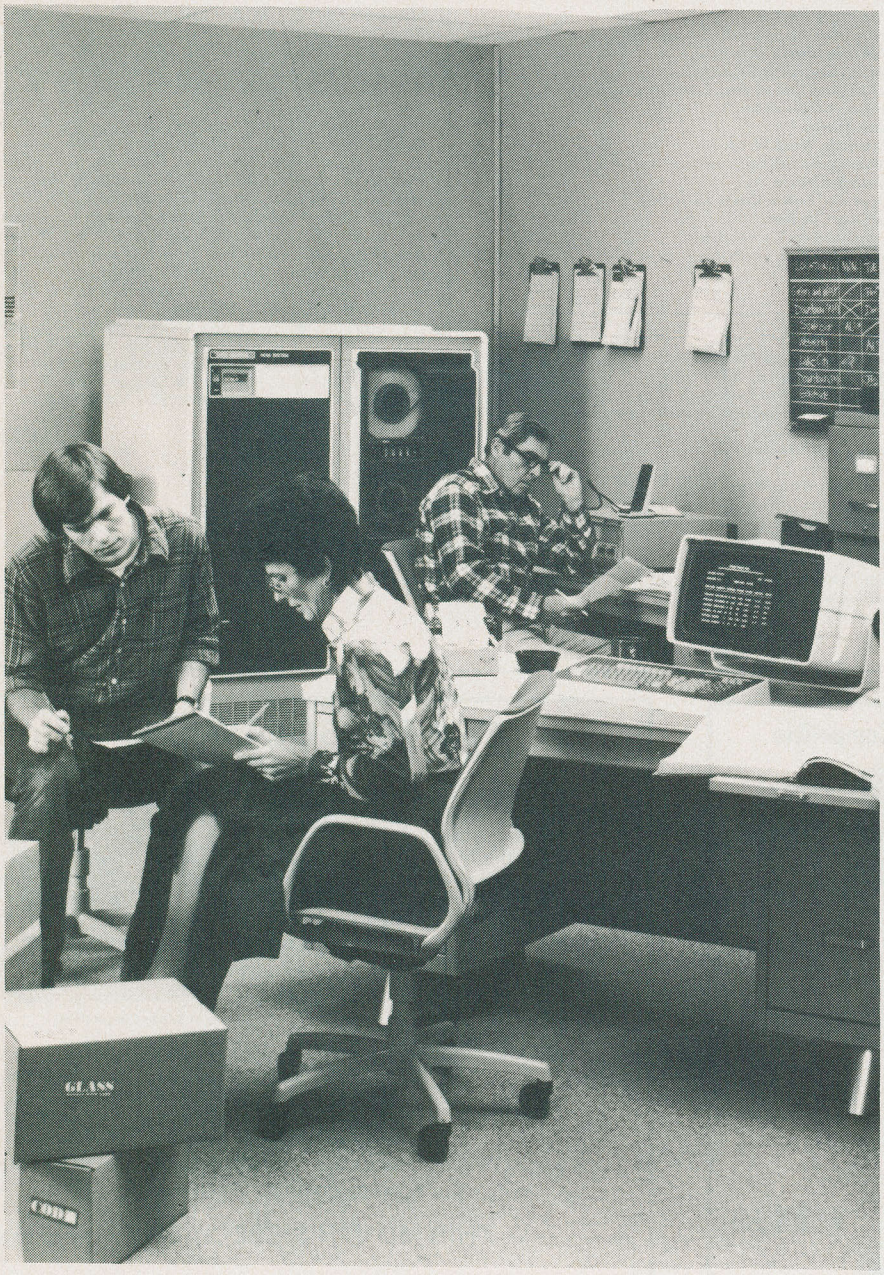


If you have found yourself up to your clavicle in languages of late you will no doubt have heard a lot of very deceptive things about FORTH. Some of them may even be true. You might want to compare it with this look at FORTH... which is all true.

by Ian Heppell

There has been much debate recently about which computer language is most suitable for use on small computers. Much of this debate is fueled by the deficiencies of BASIC . . . its lack of modularization and of control structures, slow execution, lack of portability and the like. BASIC is not a good language for even moderately large programs. The question is, how should it be replaced?

The usual first step away from BASIC is toward assembly language. While assembly language is irreplacable for some applications, it is difficult to use effectively. Even the fancy macro assemblers fall far short of being "high level", so a program developer is certain to spend a significant amount of time worrying about low level operations and, of course, debugging. Above all, assembly language is not portable.

True compiled languages such as Pascal, C, and FORTRAN are becoming realistic alternatives to BASIC on the micro computer. These offer varying degrees of portability and quality, but are typically monolithic black boxes with minds of their own. While this situation is improving, they still generally require two disk drives, which will be used very heavily on a typical sixty-four K machine. The compiled code is often not as space and time efficient as one would like.

The advantages of FORTH are many. It is often faster than compiled languages or poorly written assembly code. FORTH actually includes the ability to create machine code for time critical routines. FORTH is compact . . . applications generally don't extend the standard eight kilobyte core system very much. FORTH is an extensible language . . . if the language is missing something you want, you can add it. In fact, every FORTH program is simply an extension of the language. For this reason . . . and because of it . . . a FORTH system is integrated. The operating system, text editor, file handler and even the FORTH interpreter itself are all written in FORTH. The programmer has control of everything.

This article will provide an introduction to the largely unexplored world of FORTH.

Fundamentals

Learning FORTH involves coming in contact with a number of new concepts. Most of these can seem confusing and even overwhelming at first glance, but running into them in the proper order can help a lot. In particular, there are two concepts on which most of FORTH is based, the *stack* and the *word*.

A stack is basically a pile of numbers. You *push* numbers on a stack and *pop* numbers off. Both these operations involve the top of the stack, so that in order to pop the bottom of the stack, you must first pop all the numbers on top of it. In technical jargon, a stack is a LIFO . . . last in first out . . . queue. That just about says it all.

Stacks are used by most languages, although the programmer rarely needs to be aware of it. In FORTH, stacks are the fundamental method of passing information between routines. For example, you may have a routine that pops the top element of the stack, squares it, and pushes is back on the stack. Any other routine could use this feature by simply pushing the number it wanted squared and calling the squaring routine.

FORTH routines are called *words*. The name of a word can be any sequence of ASCII characters except blank, null, or return. For example, ".", dot quote, is a FORTH word that prints a character string to the terminal. Such liberal use of non-alphanumeric characters can make reading a FORTH program difficult for the beginner, but you get used to it pretty quickly.

A word is either a string of machine code instructions, a variable, a constant, or a collection of other FORTH words. Once a word has been defined, it can be used in the definition of other words. Thus, words become more high level as they are built up of higher level words, until the whole program is represented by one word. Even these programs can be included as parts of a kind of a meta-program, as is the case of the FORTH system itself. FORTH can be made to work at an arbitrarily high level.

Arithmetic in FORTH

In any introduction to FORTH I've seen, a lot of fuss has been made of *post fix* notation and its relative merits. You may have run across post fix notation if you've ever had to use a Hewlett-Packard calculator. It is basically a way of representing an arithmetic expression so that the operation comes after the two operands. For example, 3 + 4 becomes 3 4 +, and 5 * (6 + 7) becomes 5 6 7 + *. Notice in the second example, post fix requires two fewer characters than "in fix", or regular notation.

The real advantage to using post fix notation on a computer is that the expression can be calculated from left to right. In the second in fix expression, the computer has to remember the multiplication, and not perform it until the addition is taken care of. This is a complex task when implemented for arbitrarily complicated expressions.

In fact, all computer languages that understand in fix notation must convert in fix expressions to post fix expressions before they can calculate them. The program that does this is a parser. FORTH and Hewlett-Packard calculators have no built-in parsers, so users are forced to use post fix notation. This saves the computer space and time at the expense of increased effort on the part of the programmer.

In the case of FORTH, post fix notation has a real advantage of working perfectly with the language's use of the stack. It is very natural for routines to contribute to an arithmetic expression by simply leaving their results on the stack. Using our squaring example from earlier, we could calculate X**2 + 5 with

80 CONSTANT MAXWIDTH

You might also want a variable that kept track of your current left margin. You would define it...

5 VARIABLE LMARG

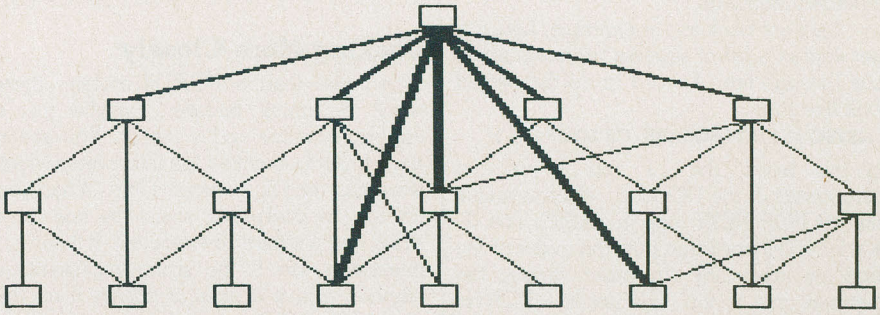
To use a variable, you would:

LMARG @

to fetch... @... the value of LMARG and put it on the stack, or you would:

N LMARG !

to store... ! ... the value N in LMARG. In other words, the main difference between variables and constants in a FORTH system is that execution of a constant puts the value of the constant on the stack, while execution of a variable puts the address of the value on the stack, which can then be referenced.



How FORTH words call each other: High level words call lower level words until machine language is reached at the lowest level.

X SQUARES 5 +

In other words, the use of post fix notation is ideally suited to FORTH, although if you really wanted to use in fix expressions, you could extend the language to give you the capability.

Defining New Words

The words in a FORTH system are stored in what's called a dictionary. The words are basically stacked, with each word defined in terms of the words underneath them. Words can be linked together in *vocabularies*. For example, a set of words can be used for editing source text, and can be grouped together in a vocabulary. This way, the editor words can be ignored if no editing is going on.

The simplest types of words are constants and variables. These are pretty much what their names imply. If you were writing a text editor for an eighty column screen, you might want a constant that told you the maximum width of your screen. You would define it like this...

Thus, variables allow a change of value at the cost of a little execution time.

The most important words you'll create are those that perform some kind of manipulation on data. These can be compiled into the dictionary in several ways, depending on what type of word you are defining. The most common is the *colon definition,* so-called because the colon word in FORTH is used. The colon creates a word that is defined in terms of other FORTH words. For example:

: SQUARE DUP * ; (n — n)

would add our word SQUARE to the dictionary. A few comments are in order.

To begin with, the colon puts us into compile mode. The next string will be the name of the new routine... SQUARE. DUP is a word that duplicates the top entry on the stack, leaving two numbers where there was only one. The * means multiplication. The semi-colon takes us out of compile mode. This is the end of the definition. The left parenthesis indicates a comment, delimited by a right parenthesis. The " n --- n " is stan-

dard notation describing what the word does to the top of the stack. In this case, the word takes a sixteen bit number, n, and leaves a sixteen bit number.

When the FORTH interpreter sees the colon it makes an entry on top of the dictionary with the name of the word to be compiled. It then scans the rest of the line and pulls out the words that will make up the definition. For each of these words the interpreter finds its address in the dictionary and puts a pointer to this routine in the definition. This process continues until the semicolon is reached, at which the point the definition is completed.

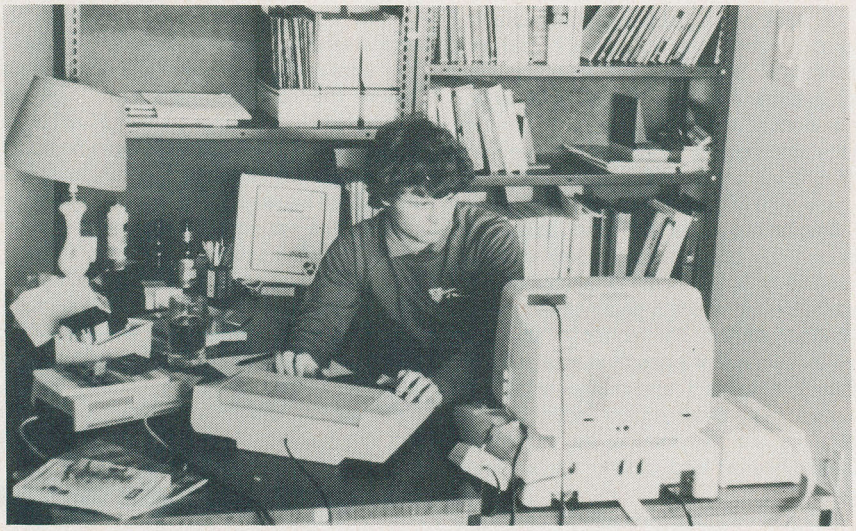
Thus, a colon compiled word is basically a string of pointers to other words in the dictionary. These pointers *thread* down the dictionary until true machine code is reached. This is why FORTH is classified as a threaded language.

Let's get back to our example. Let's say we wanted a list of squares of the numbers one through ten. A word to do that would look like this:

```
: LISTSQ 11 1 DO I SQUARE . CR LOOP ; ( — )
```

In this word, the 11 and 1 are the parameters of the DO loop, which is a little like the FOR NEXT loop in BASIC. The "I" is a FORTH word that puts the index of the loop on the stack, in other words, the numbers one to ten. The dot is a FORTH word that prints the top number on the stack. CR performs a carriage return and LOOP is the end of the DO loop, like NEXT in BASIC.

Notice the way LISTSQ supplies SQUARE with parameters by just leaving them lying on the stack. Again, this works nicely with the post fix notation that SQUARE uses to perform its multiplication.



Looking More Closely

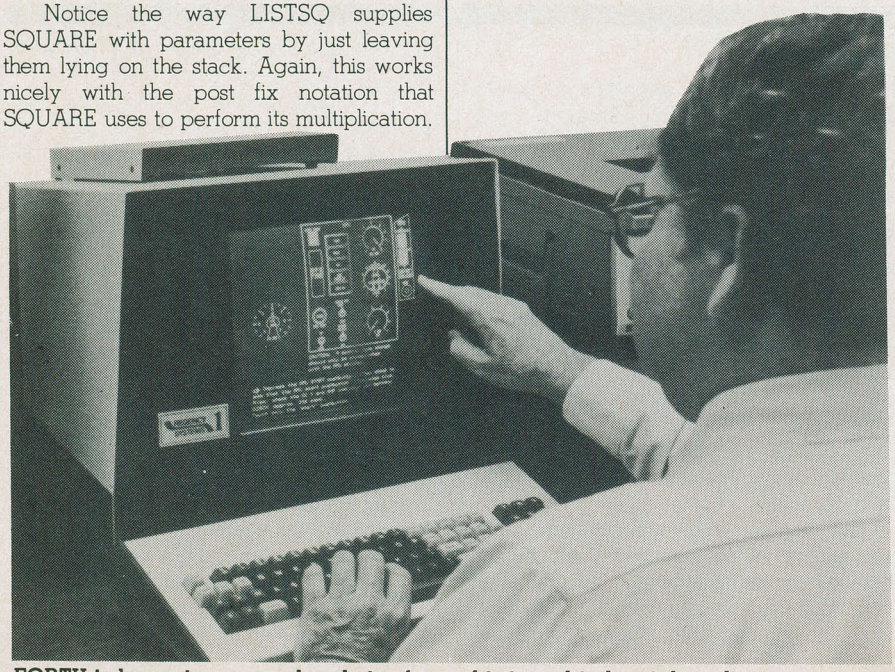
When you load a FORTH system, there won't be much fanfare... maybe just a copyright notice and a cursor. You are in the infinite loop called the interpreter which is waiting for you to enter a line. When you do so, the interpreter scans the line for a string and attempts to execute it. If it can't, it checks to see if the string represents a number, and if it does, it pushes it on the stack. If the string is neither a word nor a number, you'll get an error message.

Most words execute in a very straightforward way, as in the case of SQUARE... it goes away, does something, and then returns. Other words have more subtle effects, such as changing the value of a system variable. A good example of such a word is HEX, which causes FORTH to read and write all numbers in hexadecimal format. In fact, HEX simply loads the system variable BASE with the number sixteen. Any number can be placed there and give legitimate results... although the common modes are base two, eight, ten, and sixteen.

Still other words cause FORTH to leave execution mode and enter compile mode. The example we have seen is the word ":"... the colon. In compile mode, the interpreter reads and analyses strings in the same way, but instead of executing them, it passes the details of the string to the compiler, and the compiler enters the appropriate information in the dictionary. Eventually, a word will be found that will instruct the interpreter to leave compile mode, complete the definition, and return to execution mode. In the case of a colon definition, this word is the semicolon.

The whole FORTH system is accessed from the interpreter. This includes the operating system, editor, assembler and whatever other environments you might have in your system. This simplicity is what attracts many people to the language.

Easily the most annoying aspect of a standard FORTH system is its primitive file system. In fact, it's hardly a file system at all, but rather a bunch of contiguous pages, or *screens*, of text. FORTH treats the disk as a large block of memory which it can access five hundred and twelve or one thousand and twenty-four bytes at a time. There are, in fact, no files.



FORTH is becoming a popular choice for sophisticated industrial applications

Listing 1

```
2 LIST
SCR # 2
  0 ( A FORTH program that will guess a number from 1 to 100 )
  1
  2 0 VARIABLE LOW
  3 100 VARIABLE HIGH
  4
  5 : GUESS   HIGH @ LOW @ + 1+ 2/ :
  6
  7 : RULES CR
  8           ." You think of a number (1 to 100) and  " CR
  9           ." I will try to guess what it is " CR CR
 10           ." Answer L if I'm low " CR
 11           ."        H if I'm high " CR
 12           ."        C if I'm right " CR CR
 13         ;
 14
 15                                              -->
OK
3 LIST
SCR # 3
  0 : CALCGUESS DUP 76 = IF
  1                        DROP LOW ! GUESS
  2                      ELSE DUP 72 =
  3                        IF
  4                          DROP HIGH ! GUESS
  5                        ELSE
  6                          DROP RULES
  7                        THEN
  8                      THEN :
  9
 10 : CORRECT?   DUP . ." ? " KEY DUP EMIT CR DUP 67 = :
 11
 12 : INIT RULES 0 LOW ! 100 HIGH ! :
 13
 14
 15                                    -->
OK
4 LIST
SCR # 4
  0 : PLAY INIT
  1       GUESS CORRECT? NOT
  2       IF
  3         BEGIN
  4           CALCGUESS CORRECT?
  5         UNTIL
  6       THEN
  7       DROP DROP
  8       :
  9
 10 CR ." Type PLAY <RETURN> to play the game! "
 11
 12 ( End of guess the number game )
 13
 14
 15
```

This is a "guess the number" game written by the author in FORTH. The computer invariably wins.

As I mentioned, disk storage in a standard FORTH system is broken up into screens of one half or one kilobyte, usually dependent on the width of your screen. FORTH text can be stored and edited in these screens, and then read by the interpreter just as it would be read from the keyboard.

Go Forth

In summary, FORTH has many unique advantages, especially on a small computer. It is compact, fast, modular, integrated and portable. It is reasonably easy to learn and is available on virtually every micro you're likely to use.

FORTH's weaknesses are its poor readability and lack of built-in file capability. Note, however, that the former problem can be reduced with careful coding and the latter can be eliminated with the addition of a user written file system. In fact, FORTH can become just about anything you want it to be. If you're still looking for a language system you can live with, FORTH may be worth a try. **CN!**

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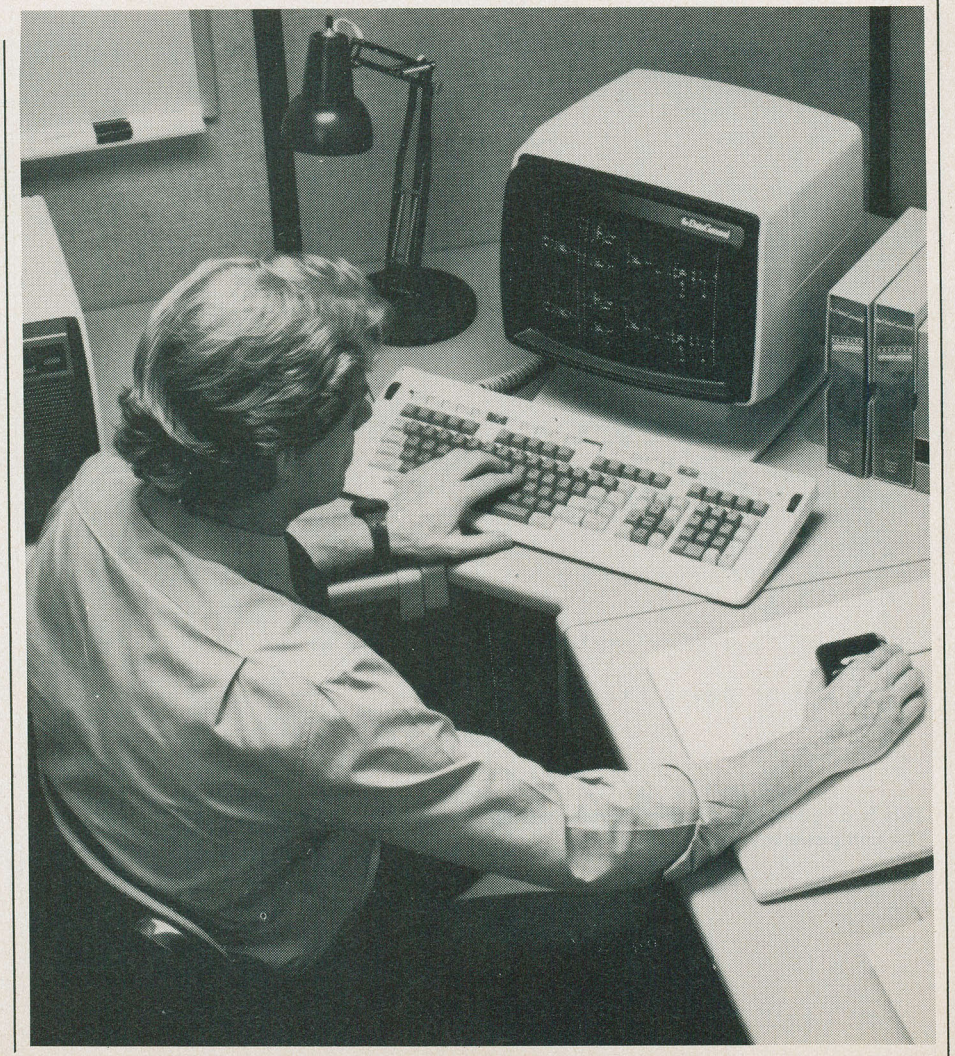
The Doctor's Little Black Computer

Despite the advances in medical technology of late, the practicing physician uses very little computer power in the running of his office. Here's a look at how this is changing.

by Bruce R. Evans, M.D.



Chances are, next time you're in your doctor's office, you'll see a new instrument. It won't be something else to poke, probe or prod you. It won't be a pain-free needle or a painful scale. No, it'll be a computer.

For years, hospitals have been using computers to automate paper handling tasks. Space age computer controlled X-ray devices plot out your brain, liver and almost anything else you have. Most lab tasks are now routinely handled by computer controlled equipment. In fact, many times it's easier and cheaper to do a whole battery of computer controlled tests than to do one or two manually. Until now, however, very little of this has spilled over into your family doctor's practice.

To better understand this lag, you must know what goes on in a doctor's office. Oh, I don't mean the medical procedures involved in a yearly checkup or in having your Space Invaders wrist treated. I mean the other half that you don't know about until your doctor's secretary phones up to tell you that your insurance company didn't pay your bill. As you hear her threats to give back your appendix

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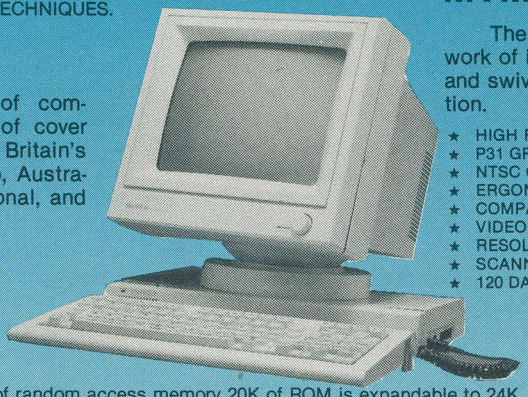

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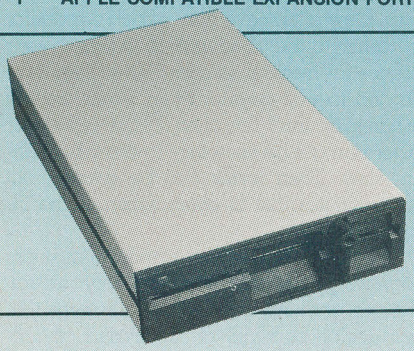
7 **INTERFACES FOR A WIDE ARRAY OF I/O DEVICES.** The MPF-III has a standard 7 interface port configuration that gives you the ability to interface with disk drive, printer, cassette recorder, Z-80 CP/M card, Chinese character card and monitor or television.

3 **EXPANSION PORTS FOR EASY EXPANDABILITY.** Designed with user flexibility in mind, the MPF-III offers 3 expansion slots for special user application.

1 **APPLE COMPATIBLE EXPANSION PORT.** One Apple IIE hardware compatible port gives you total expandability.



The Slimmer floppy disk drive from Multitech is a half height 5¼" minifloppy drive that offers economical compatibility with most popular computers on the market today.

APPLE AND IBM COMPATIBLE

• Fast Positioning Time - Stepper motor and direct DC drive motor • Steel belt Drive Mechanism • Safe Media Protection track-O sensor • Write Error Protection Circuits • Half Track Capability • Forty track capability • Standard IBM PC Interface - The Slimmer provides a 34 pin standard format interface for use with the IBM PC • Storage Capacity: 250K Bytes.
DS/DD disk drive for I.B.M. also available.

Special Function Keys
Twelve User Programmable keys each consist of four command levels, the pre-programmed functions of the first level include:

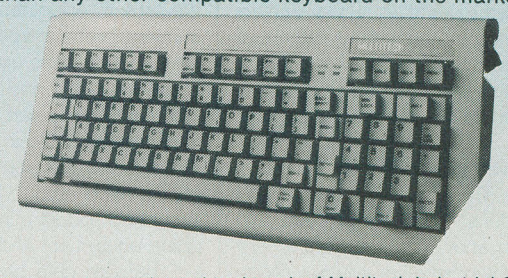
* Catalog	* Auto line number
* Load	* Auto line number Reset
* List	* Keyboard Click Toggle
* Save	* Monitor Mode Entry Key
* Delete	* Boot key for Apple port 6
* Run	* Home

The remaining 3 levels of 36 special code combinations are designed to be programmed by the user according to individual needs.

One Key Basic Feature
A total of 52 BASIC commands can be entered with the convenience of the push of a button. A key command map for replacement on the AccuFeel is provided to facilitate operation.

User Definable Keys
The AccuFeel is equipped with 10 user definable keys that utilize up to 60 bytes of memory for user defined functions. Three on board keys control definition and memory access functions.

The AccuFeel compatible keyboard adds a new world of power and convenience to Apple II computing. With more features than any other compatible keyboard on the market.



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The Doctor's Little Black Computer

or take the new baby away unless you pay up, you realize there's also a business side to medical practice.

Money

In fact, the business side of medical practice has traditionally been where most of us physicians are lost. A computerized office system should be a boon to all of us. Unfortunately, until recently there was no cost efficient way of doing this. Personal computers are changing all this.

The first breakthrough has come with the hardware itself. As little as five years ago, there were no dependable personal computers sophisticated enough for the job. Oh, certainly some doctors were tinkering with their own systems but fourty eight K machines with single density, single sided floppy discs weren't the solution. Printers were noisy, slow and expensive. Service facilities were non-existent. If something broke down, it had to be shipped off for weeks to some place in California or other nether region. Compatible peripherals never were unless you had a masters degree in engineering. I.B.M., Xerox and Zenith have forever changed this.

"five years ago there were no dependable personal computers sophisticated enough for the job."

The second problem was and still is software. Most programmers are not doctors and seldom have enough insight into medical practice to write suitable programs. Integrated packages take a lot of time and effort to put together. It has always been more profitable to write them for the hundreds of thousands of small businesses that follow standard business procedures than to write for ten thousand demanding medical practices. Programmers haven't been helped by the various provincial medical insurance schemes that have never been able to agree to a standard billing procedure that could be understood by programmers.

Let's look at where your doctor will be using his computer. The first area is in standard business applications. Accounts payable, accounts receivable and a general ledger are handled the same way whether you're a physician or General Motors. It's merely a matter of scale. There are many programs available here but again the problem crops up, programmers are programmers. They no more are accounting specialists than they are medical specialists. My accountant would have turned grey had I used some of the early accounting packages that came out for personal computers. I still remember a salesman telling me that if I made an error in entering daily cash payments, I could correct it at the end of the month by fudging the totals a little! It's much better today.

You'll probably not notice much of a difference when your doctor computerizes his accounting. However, an efficient billing system may encourage him to bill you for items which earlier he ignored simply because it was "too much bother to keep track." On the other hand, if he finds his accounts are current, he may be making more and be less inclined to charge you for items not covered by your insurance coverage ... what you lose on the roundabout you make up on the swings. So too, if his secretary is less tied up with routine book keeping she may have more time for you.

The area that will effect you most directly will be your doctor's appointment system. Until recently, it hasn't been practical to use a computer for appointment scheduling. A doctor sees too many people with too many different conditions to use one of the standard appointment systems. He needs flexibility.

Efficient doctors use an appointment scheduling scheme called modified wave booking. This goes on the assumption that you can fairly accurately estimate how many patients you'll see in an hour even if you don't know how long each individual will take. If you then spread that number of bookings over that time, most people will be seen with a minimum wait and the doctor won't be sitting idly twiddling his thumbs. At least one company, run by a practising doctor, has come out with an appointment system that lets you initialize it to your style of practice ... one patient an hour or twenty a minute! Sixteen bit computers such as the I.B.M. PC can handle this with ease.

The big advantage to you will be that a good program will allow the secretary to enter the type of appointment you need and times that are best for you. Then, within seconds, you should have several choices. Furthermore, it should print out a list of patients for the secretary so she can phone you a day ahead to remind you. Your doctor can then use this same list on the appointment day so that he knows who and what he's seeing. There should be no last minutes searches for appropriate equipment and relevant information.

Reliable data base systems allow the appointment system to be tied in with the billing system so that data such as identification or insurance numbers need to be entered only once. Your doctor's secretary then has to make only minor changes each visit. This can be done with a full screen editor right at the time of making an appointment.

Words and Music

Another area that will effect you but which you won't see is word processing. If you are referred to a specialist, your own doctor usually sends along some sort of note telling what the problem is and why he's asking for the referral. Once the specialist has seen you, he'll send back a "consultation note", often many pages long, giving his recommendations to your family physician. Unfortunately, typing letters is often far down on a secretary's list of priorities, so while you're stewing over what's wrong with you and what has to be done, your letter's still swimming in the typing pool. With an efficient word processing package this area of congestion will be relieved.

In fact, many consultation letters that a specialist writes can be "almost form" letters. This is particularly true in the narrowest specialties such as eyes and allergies. With the entry of only a minimum amount of unique data, a consultation letter can be on the way as you're going out the door. This work both ways because sometimes your family physician is tempted not to write a referring letter if your problem is rather mundane and there's little to add to what you'll tell the consultant. Now it can be done in a snap.

An area where you may not think of the advantages of a word processor is in sick notes. How often have you asked your doctor for forms to be filled out to validate your absence for medical reasons? How often have you had to wait days or even weeks waiting for him to do this? Too often, I'll bet. Now your doctor can get his secretary to enter the relevant data. Then forms can be spewed out within minutes that fit every whim of the insurance industry.

Another area where standard business programs can be used is in inventory control. All those portions, bandaids and creams that your doctor pulls out of his myriad of cupboard have to be re-ordered. All those prescription pads, diet sheets and lab requisitions have to be printed periodically. All those out of date National Geographics ... I have current Computing Now!'s ... in the waiting room have to be re-subscribed to. A computer doesn't know if it's cataloguing widgets or scalpels. It can keep track of them all and tell what's needed, when and how much.

If these applications that I've mentioned so far were all that concerned a physician, most of us would have been using computers long ago. There are, however, a group of problems unique to a medical office that prevent the use

of standard business programs. The biggest of these is "third party billing."

What is third party billing? It simply means that somebody other than you pays for your medical care. This can be a private insurance, a government health plan or a provincial workman's compensation plan. It may even be the guy who ran into your new car with his Mack truck. The problem is that each of these parties requires billing in its own peculiar way on its own equally peculiar forms. In many cases they even pay different rates for the same thing. Worse, they change formats more often than Buckingham Palace changes guards. This is a dilemma for a computerized office. Either keep a programmer on staff to modify your programs every few months or stay with a manual system. Most of us have done the latter.

The most obvious way to get around the problem of multiple forms is to use an electronic medium ... magnetic tape, floppy disks or telephone lines. As you might expect, institutions that have been able to spawn countless forms have been equally proficient at refusing to accept an electronic standard. As a result, most programs take the relevant data ... patient identification, diagnosis and fee ... and print it out on a paper form. This form is then sent by mail, courier or carrier pigeon to the processing center where yet another human types the data back into yet another computer.

The lunacy doesn't end here. After everything is processed, the central computer prints out its data ... patient identification, fee and payment ... and again trusts it to the vagueries of manually transportation. Don't give up yet! When this valuable piece of parchment arrives at your family doctor's door it's again entered by a human into the original computer and a reconciliation is done. I don't need to trace the path of any inaccuracies, missed payments or overlooked patients. You've already seen the problem.

As some standards emerge the problems with third party billing will clear up. I won't hold my breath waiting. This is too bad because this is probably the area in which a doctor would profit the most from a computer in the office. It's also too bad for you as patients, programmers and hardware sales people because until this problem is solved, a lot of doctors won't buy computers. A large market will remain untappable.

Scalpel Please

The other big drawback to computerizing a medical office is your doctor himself. For some reason, doctors seem to be afraid of technology in the office. "It interferes with the doctor patient relationship." So do unnecessarily late appointments, misunderstood bills and lost consultation notes.

There are many systems available. I have seen three that seem suitable for personal computers and a well run medical office. The first is from MediSoft, a company run by a practising physician. It uses a Z-80 microprocessor and an S-100 bus system. You get two eight inch floppies and your choice of printers. All the software was written by this doctor. He has used it all in his office for over three years and it works. The fact that the system has been running for this long makes the system unique. Most vendors have one or two systems that have been running a month or so. Very often they haven't even this base. Yours will be their first.

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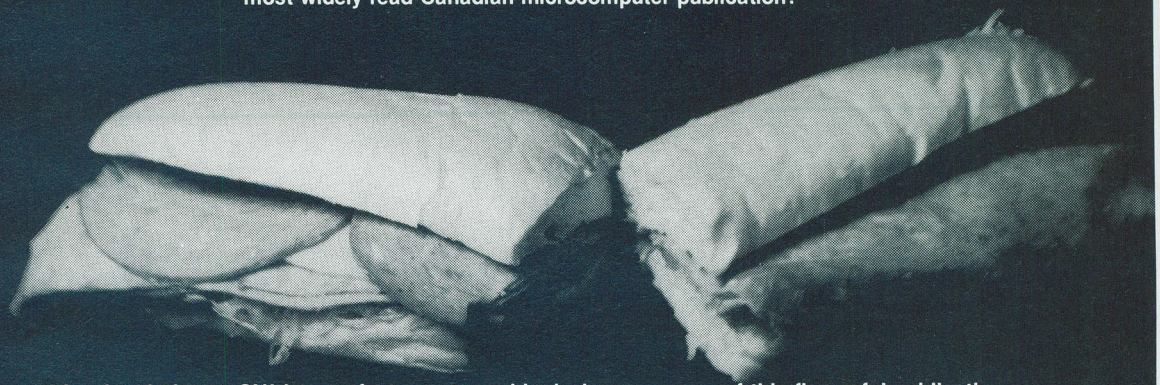

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The Doctor's Little Black Computer

MediSoft is supported by Ultec Computer Corporation in Etobicoke, Ontario. Ultec supplies the hardware, the service warranty and service contracts. They have been around for quite a few years and I think they'll be around for a while to come. This is quite a contrast to all the computer systems companies that come and go with the change of seasons.

MediSoft's package does all that I mentioned before. It's main drawback is that it's run on an eight bit machine. Some of this drawback is made up for in software. The programs were written in CBASIC, the best business BASIC available. Later they were compiled using CB-80 to very tight and fast running machine code. Unfortunately, I think all the new business software is going to come out I.B.M. compatible. Nevertheless, this is the program that I would use in my office if I computerized today. There are a number of these systems running now as well as versions for dentists and chiropractors.

The second system that I like is from Mondecan Limited in Brampton, Ontario. This system uses the Zenith Z-100 microcomputer with a ten megabyte hard disk, a five and a quarter inch floppy drive and an eight inch floppy drive. Again, you have your choice of printers. There are at least eight of these systems working in the Toronto area.

There are a number of nice features about this system. The first is the Z-100 itself. It has two microprocessors. There's an 8085 to run eight bit programs and an 8088 to run sixteen bit ones. You'll even find a socket on the motherboard for the 8087. Most of the salesmen didn't know that! The other nice feature is the mass storage ... hard and two types of floppy. This isn't just window dressing ... longer fins on a car ... but a partial answer to the "third party problem" I mentioned earlier. The Ontario Health Insurance Program (OHIP) has been accepting billings on the eight-inch disks prepared by this program and sending back the payment information on the same disk. Naturally, being a true bureaucracy the Ontario Ministry of Health also insisted on a paper printout accompanying the disk but that's no problem just as long as nobody has to read it. The five and a quarter floppies allow you to use programs that are generally available in that format and the ten meg hard disks let you store data to your heart's content.

The software is written in Microsoft BASIC. The salesman wasn't sure whether it was compiled or not. I'm not sure he knew the difference. Right now, the programs are all written for eight bit computing since Microsoft BASIC isn't able to handle more than 64K of memory yet. This didn't seem to slow the program down at the demonstration booth.

I don't know who wrote the software but he definitely isn't a doctor or doctor's secretary. There are a number of things that I found distressing. Telephone numbers are entered without a dash. When a screen of patient data is being entered, the secretary can't go back and correct any mistakes. She must continue to the end and then indicate that the data isn't correct before she can redo it. As someone proficient in programming, I know why the programmer did things the way he did. As an end user though, I'm not prepared to accept things being done just for the sake of the programmer.

The third system is still somewhat pie in the sky. The Ontario Medical Association (O.M.A.) ... our "union" ... has put together a package using the Texas Instrument's Professional Computer. Or at least they promise a package. There's a big difference. Some of the hardware isn't available just now and the software for government billing hasn't been written yet. It has been promised for the spring of 1984. Anybody who buys a computer system for which the software hasn't been written yet is nuts!

You've probably noticed that I've spent all my time talking about computers and medical office management. What about computerized patient care in your doctor's office? There isn't any.

Actual Medicine

In hospitals computers have taken over many old diagnostic tools. Computerized Axial Tomography machines (CAT scanners) use X-ray detectors rather than photographic film to record information and a real time computer then lets the radiologist dial up various views, close ups and angles from the data. In hospital laboratories, computerized auto-analysers that do twelve to twenty four blood tests at a crack give quicker, cheaper and more reliable results. Even in intensive care units, many of the monitoring instruments are overseen by computers and actually warn if serious abnormalities occur. It's conceivable that they could be programmed to take preventive action such as administering drugs through an intravenous line.

Unfortunately, these instruments have something more than computer control in common. They all cost astronomical amounts; a million dollars isn't uncommon. You just won't see any of these in a doctor's office. Not too many of us are starving but none of us has the kind of money necessary for this type of equipment.

Some companies have tried to introduce computerized instruments on a smaller scale. None of these, unfortunately, improves on the standard manual tools. Your doctor may have a microprocessor controlled blood pressure device. I sent mine back because my old manual one was just as accurate and didn't scare my patients with flashing lights and beeping speakers.

The only device that has any real future is a one about the size of a small modem, that lets you read blood sugar levels from a drop of blood. The value is immediately shown on a liquid crystal display. People with diabetes that is difficult to control find these lifesaving. Unfortunately, they have an accuracy of plus or minus thirty percent; sufficient for home monitoring but inadequate for more precise measurements needed by a physician.

Software for patient care has lagged as well. There are many trivial programs that claim to interpret laboratory results more reliably and objectively than a human can. Alas, the ones that I have seen merely tell me what I already had deduced as I entered the variables into the program. A more important reason that such programs haven't been developed is that the programmer must have an expert knowledge of the medical physiology involved. This requires that he be both a physician and professional programmer. There aren't many of these creatures around.

"The biggest problem is third party billing."

Files

I have left a huge area to the end on purpose ... the one that most physicians see as justifying a computer in the office. It's using a computer to store all your medical records. At first glance, this seems reasonable. Think of being able to immediately read all the information on Mrs. Smith and her family at the touch of a key. Think of using this data base for research into the incidence of various diseases, drug interactions and patient recalls. It just won't work.

Present medical files are a throwback to the turn of the century. Attempts to improve manual record keeping fall on deaf ears. Attempts to implement computer compatible records haven't even been made. If you're interested in looking further into this matter, I'd recommend *Physician's Primer on Computers* by J.F. Branejs. Even if this problem is overcome, there's still the inefficiency of entering all your information into the computer and thereby tying it up for anything else. I prefer my scribbled notes with matchstick drawings any day.

The area for computer applications in medicine with the most potential that's still untouched is electronic mail. Earlier I mentioned advantages of a word processor in easing doc-

tor to doctor communications. This could be even faster if all those lab reports, consultation letters and hospital bookings were sent over the telephone, stored on hard disk and then printed out as needed. So too, your doctor could dial up an international medical data bank to get him instant access to recent diagnostic and treatment advances. Think how useful this could be to an isolated physician in Northern Ontario.

I expect to see better patient education by computer. Instead of being bored with out of date magazines, you could use a terminal in the waiting room to learn about nutrition, birth control and other topics that take a lot of time to discuss but which really don't need your doctor present. I expect to see programs that will let your doctor enter your present medication, what he plans to prescribe and other pertinent data such as your size and age. Within seconds, he would have guidelines to the dose as well as possible side effects and interactions. But you and your doctor would benefit.

"What about computerized patient care? There isn't any."

I hope this article has prepared you for some of the changes you'll be seeing in your doctor's office as he adapts to computer technology. I hope it will open your mind to ways to advance this process and profit from it. There are a lot of programs that need to be thought up, written and sold. There are about thirty two thousand doctors in Canada who could be persuaded to hire you to advise them on buying a system, to help implement computerization and to customize some of their programs. Maybe one of you reading this article will dream up the medical equivalent of VisiCalc.

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600 Sherbourne St., Suite 611
Toronto, Ontario
M4X 1W4

Ultex Computer Corporation
770 Browns Line
Etobicoke, Ontario
M8W 3W2

Mondecan Ltd.
P.O. Box 582
Brampton, Ontario
L6V 2L6

Mr. Shaul Ezer
Ontario Medical Association
240 St. George St.
Toronto, Ontario
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Physician's Primer on Computers
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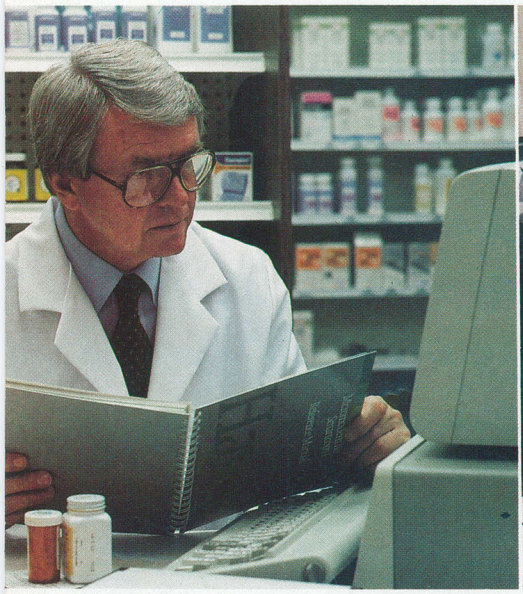

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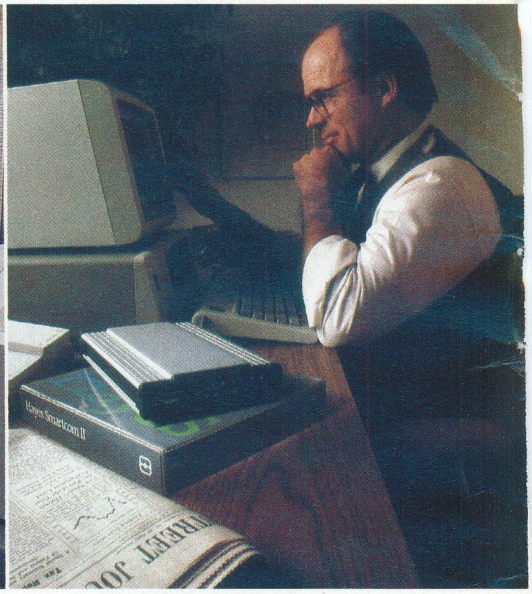
Gary: The pedigrees for next week's auction are as follows...



Sold 1000 shares at 33 for net profit of 6000. Richard.

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Choose your speed; choose your price. The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. For longer distance and larger volumes, Smartmodem 1200 operates at baud rates of 300 or 1200, with a built-in selector that automatically detects transmission speeds.

Both work with rotary dials, Touch-Tone® and key-set systems; connect to most time-sharing systems; and feature an audio speaker.

Smartmodem 1200B™ is also available as a plug-in board. Developed specifically for the PC, it comes packaged with Hayes' own communications software, Smartcom II.™

Smartcom II. We spent a lot of time developing it, so you can spend less time using it. Smartcom II prompts you in the simple steps required to create, send, receive, display, list, name and rename files. It even receives data completely unattended—especially helpful when you're sending work from home to the office, or vice versa.

If you need it, there's always "help." This feature explains prompts, messages, etc. to make communicating extra easy.

With Smartcom II, it is. Case in point: Before you communicate with another system, you need to "set up" your computer to match the way the remote system transmits data. With Smartcom II, you do this only once. After that, parameters for 25 different remote systems are stored in a directory on Smartcom II.

Calling or answering a system listed in the directory requires just a few quick keystrokes. You can store lengthy log-on sequences the same way. Press one key, and Smartcom II automatically connects you to a utility or information service.

Hayes™

Smartmodem 1200B. (Includes telephone cable. No serial card or separate power source is needed.)

Smartcom II communications software.

NOTE: Smartmodem 1200B may also be installed in the IBM Personal Computer XT or the Expansion Unit. In those units, another board installed in the slot to the immediate right of the Smartmodem 1200B may not clear the modem; also, the brackets may not fit properly. If this occurs, the slot to the right of the modem should be left empty.

And, in addition to the IBM PC, Smartcom II is also available for the IBM Personal Computer XT, DEC Rainbow 100, Xerox 820-II, Kaypro II, Compaq Portable, Corona Portable PC, and Columbia MPC.*

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New Products

Hard Disk Portable

Corona Data Systems, Inc. has announced the addition of a portable hard disk-based personal computer to its popular family of sixteen bit IBM PC-compatible microcomputers.

The PPCXT, like other models in the Corona family, is compatible with virtually all software applications independently developed for the IBM Personal Computer. It addresses user requirements for greater disk storage and it offers a host of standard features and expansion capabilities.

The Corona PPCXT incorporates a half-height, five and a quarter inch ten megabyte Winchester disk drive in the slot where a second floppy drive is located in the company's floppy-based portable P.C. The base unit includes an Intel 8088 CPU, two hundred and fifty-six kilobytes RAM a ten megabyte hard disk drive, a three hundred and sixty K drive, hard disk controller, RS-232C serial port, Centronics-compatible parallel port, detachable eighty-three key IBM PC-compatible keyboard, four IBM PC-compatible expansion slots and graphics resolution of six hundred and forty by three hundred and twenty-five pixels.

Bundled software includes MS-DOS Release 2.0, GW Basic, MultiMate word processor and PC Tutor self-teaching program.

For more information contact Corona Data Systems, 31324 via Colinas, Suite 110, Westlake Village, CA 91361 (213) 706-1505.

Circle No. 34 on Reader Service Card

3-D Calculations

Report Manager by Datamension Inc. is a 3-D spreadsheet that has two hundred and fifty five by two hundred and fifty-five cells per page and is two hundred and fifty-five pages deep. Full computation with graphics, and data transfer is possible in all three dimensions. This package has been completely rewritten to take advantage of viewing. This spread sheet is not a Calc-clone, but a powerful data management spreadsheet. Report Manager is distributed in Canada by Remtek in Shelburne, Ontario.

Interested parties can contact Remtek at P.O. Box 668, Shelburne, Ontario L0N 1S0.

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New Products

Disk/Video Interface
A new TRS-80 Disk/Video Interface will ensure that home and business users are able to realize the full potential of Radio Shack's Model 100 portable computer.

The interface contains one five and one quarter inch double density floppy disk drive, which allows for maximum storage of one hundred and eighty-four K. An optional second internal floppy disk unit can be added. The video interface allows for connection of the Model 100 to a standard video monitor. It will display twenty five lines of forty or eighty characters (user-selectable). A built-in RF converter also allows connection of the Model 100 to a regular television set, with twenty five by forty character display. The video interface will not support dot graphics.

When connected, the Disk/Video interface automatically loads special software into the Model 100 to provide the linkage between the two units. A minimum of sixteen K of memory is required in the Model 100.

The Disk/Video interface is available at Radio Shack Computer Centres, stores and authorized dealers from coast to coast.

Circle No. 38 on Reader Service Card

Lotus 1-2-3 for Tandy 2000
Tandy Corporation has signed an agreement with Lotus Development Corporation to offer one of the most popular microcomputer software programs on the market for use on the Tandy TRS-80 Model 2000 personal computer.

Lotus 1-2-3 integrated software has been widely acclaimed for the speed at which it manipulates data. The Tandy 2000's advanced Intel 80186 processor and faster clock speed enables Lotus 1-2-3 to perform several times faster than on 8088-based personal computers.

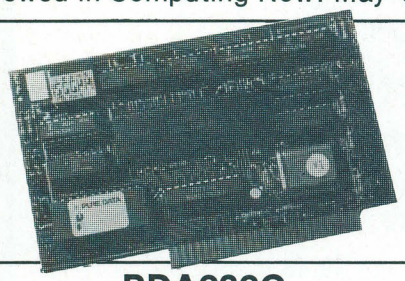
The spreadsheet is capable of handling two thousand and forty-eight rows of two hundred and fifty-six columns and uses all available memory.

Equipment required to use Lotus 1-2-3 includes the Tandy 2000 with at least two hundred and fifty-six kilobytes of RAM. The program may be used with the VM-1 High Resolution monochrome monitor with optional High-Resolution Monochrome Graphics or the CM-1 Colour Monitor with colour graphics option. The optional graphics features are recommended.

Lotus 1-2-3 will be available by mid-1984 at Radio Shack Computer Centres, and participating stores and dealers nationwide. **CN!**

Circle No. 39 on Reader Service Card

PDA232C
APPLE II SERIAL I/O CARD
[As reviewed in Computing Now! May '83 (P.61)]



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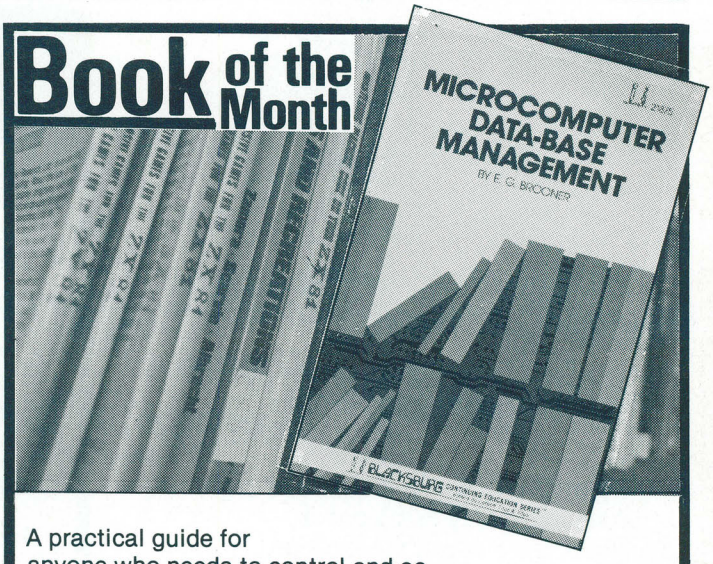
Book of the Month



A practical guide for anyone who needs to control and access large amounts of data with a microcomputer. Complete tutorial shows routines you can use to write and implement your own data-base programs. Also explains step-by-step operation of WHATS IT, SELECTOR, and PROFILE, just 3 of many data-base packages on the market, and evaluates their performance.

SB21875: MICROCOMPUTER DATA BASE MANAGEMENT $18.50

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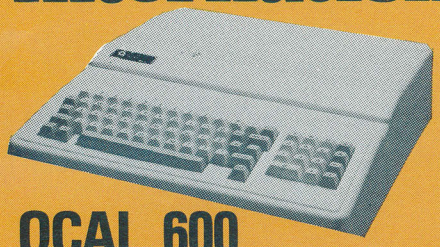

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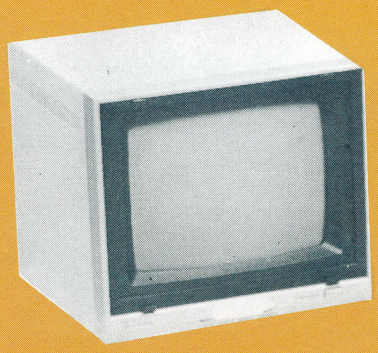

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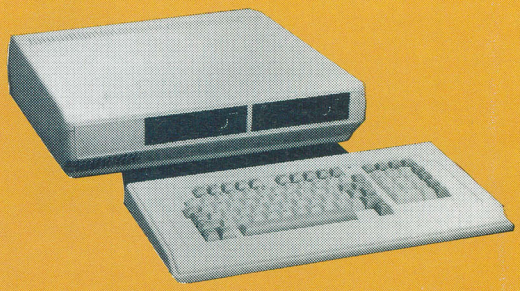

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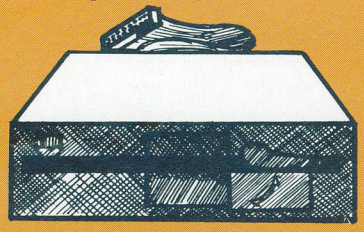

*LASER SLIM LINE

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Access time track to track 6M. SEC
Storage capacity 40 tracks 163K bytes
Controller $79.00

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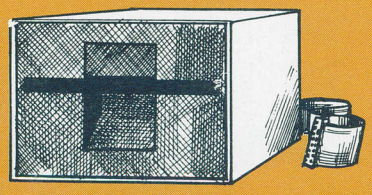

*LASER FULL HEIGHT

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WHEN SPREADSHEETS DON'T GIVE YOU THE PICTURE...

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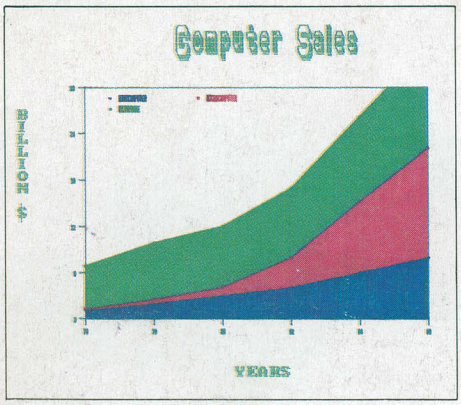
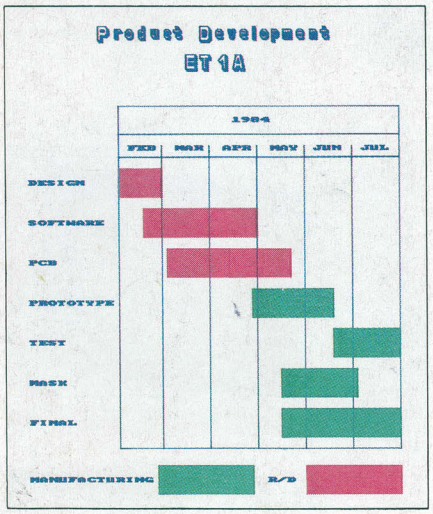
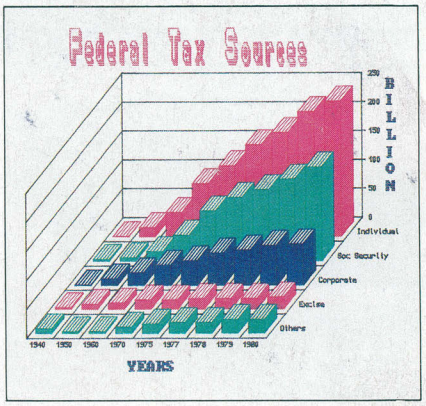
STATISTICS



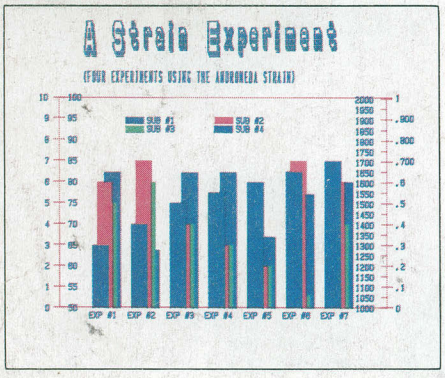
GANTT CHARTS
PROJECT SCHEDULING



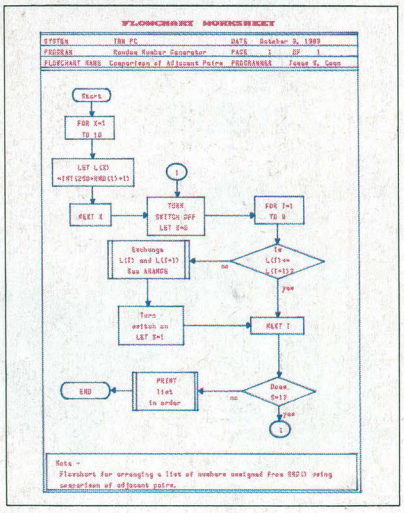
3-DIMENSIONAL
BAR CHARTS



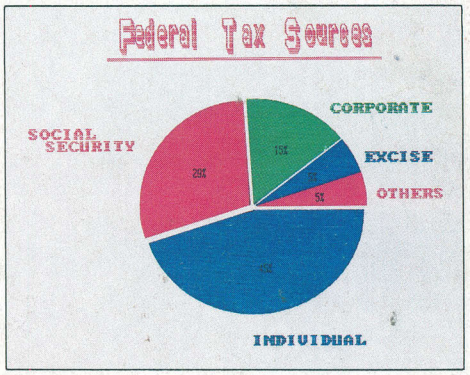
MULTI-SCALE BAR CHARTS
NEGATIVE BAR CHARTS



FLOW CHARTS
ORGANIZATION CHARTS



PIE CHARTS



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